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Selection Process of Sustainable Indicators for the Algarve Region—OBSERVE Project

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Received: 1 December 2018; Accepted: 8 January 2019; Published: 16 January 2019



Abstract: The selection of indicators for the Observatory of Sustainability of the Algarve Region for Tourism (OBSERVE), poses challenges, namely which indicators are relevant to stakeholders and how to assure that information is available. To support the selection of the environmental, sociocultural, economic and institutional indicators, an engagement process was designed and applied, which included meetings with stakeholders, a workshop and an online survey. The results showed that both workshop and online surveys reflected, in general, similar opinions, thus allowing the selecting of the sustainable development indicators for the Algarve region. Additionally, the results showed that nearly 75% of the indicators can be obtained from national statistics and, therefore, can be used on the OBSERVE project, assuring a quick flow of information. As limitations, it is important to mention that the other 25% will need further development, in order to provide data for indicators, like carbon management and client satisfaction. With this approach, the observatory will survey and evaluate the sustainable development of the region (status and trends), based on indicators that answer to the strategic needs of system's main users, with social and economic implications, i.e., public institutions, economic agents, tourists, local communities and residents.

Keywords: sustainable indicators; Algarve region; OBSERVE project; sustainable tourism

1. Introduction

Tourism has important impacts on society, economy and environment, also having a great potential to make progress across the Sustainable Development Goals (SDGs). If well supervised, the tourism sector can create quality jobs, reduce poverty and offer incentives for environmental preservation, helping on the transition towards more inclusive and resilient economies. However, without proper safeguards and investments, expansion of the tourism market will increase pressure on biodiversity and the ecosystems on which the livelihoods of local communities depend [1].

Sustainable development is a challenge for touristic activities and regions. Tourism must be understood and managed in a wider context of sustainability and it is undoubtedly clear that the offer of the touristic destinations must take it into consideration [2]. The development and prosperity of a touristic region will depend on it [3]. Sustainable tourism must explore major holistic issues and opportunities.

In Portugal, tourism receipts achieved, in 2016, a value of 7% of per capita GDP and 6,3% of employment, with more than 53 million overnight stays in 2016. The Algarve is responsible by a share

of the overnights of 34%, corresponding to the most important touristic region in Portugal. In a 10-year strategy [4], sustainability is one of the 10 challenges proposed by the Portuguese tourism policy (2017).

Monitoring is essential for considering and identifying the trends, dynamics that support policies, strategies and stakeholders decisions using different type of information, from adequate statistics [5] to other database sources, such as TripAdvisor [6].

Observatories have an important role in monitoring and supporting decisions at public and private level, showing the status and trends of the sustainability development reality. The OBSERVE project—Observatory of Sustainability of the Algarve Region for Tourism [7], under development by the University of Algarve, intends to be an instrument for monitoring and evaluating the sustainability levels of the region. Its main goal is to provide environmental, economic, sociocultural and institutional indicators to support the decision-making process, for a sustainable growth of the Algarve region. This two-year project seeks the widest possible participation from central and local administration, universities and research centres, as well as, enterprises, associations, tourists and citizens, aiming to be an added value for the stakeholders.

The Observatory should reflect the region's performance, responding to the strategic needs and expectations of the different stakeholders, as well as assuring that information is uploaded automatically from reliable and updated sources, in order to ensure the continuity of the OBSERVE platform in the future [8].

The selection of the indicators is considered a fundamental step, bringing several challenges and opportunities [9], and special attention should be devoted promoting active participation of the stakeholders during this phase [10], assessing the region development and allowing the measure of sustainable tourism trends and competitiveness.

The need for the users to be connected is growing, namely the use of apps in tourism sector like location-based services [11]. An important opportunity raised by integrating new technologies (information and communication technologies, ICTs) in the business environment [12], to engage key stakeholders, to assure flow of the information. The paper structure presents a literature review of sustainable indicators framework applied to tourism (Section 2), the conceptual framework and the research question (Section 3), and the methodology developed and implemented for the selection of potential indicators based on stakeholders' engagement (Section 4). The results obtained are presented and discussed in Sections 5 and 6. The paper finishes with the conclusions (Section 7). The questionnaire is presented in Appendix A, and the results are shown in Appendix B.

2. Literature Review

2.1. Sustainable Indicators Framework

Nowadays, it is not possible to understand competitiveness without relating it to sustainability. Many authors have highlighted this relationship and advocated that sustainability can improve competitiveness [13–16].

The application of indicators for practical assessment of sustainability is still in an immature stage. Different authors [17–20] reported that the application of systematic appraisal of sustainability in tourism context is very rare. Most studies that deal with these issues are merely descriptive, subjective and heavily reliant on qualitative data.

Other works [18,19,21–23] concluded that putting systematic assessment of sustainability into real cases is not well developed and criticize it for its restricted application to specific cases [21]. Despite this situation, many indicators framework are developed and exist in the literature, but very few are implemented and evaluated practically [23–26].

Verma and Raghubanshi [9] identified external and internal challenges through which sustainable development indicators can be analyzed, reporting the most common issues met during steps of development and implementation of indicators (preliminary assessment, goals, selecting process,

set baseline, selecting targets, application, evaluation, report findings, application of findings and sustaining indicators framework).

The number of indicators to assess the sustainability of tourism remained unclear [21]. For the World Tourism Organization (UNWTO) [27], 12 to 24 indicators are accepted to be optimal, while Sors [28] argues that 20 to 50 indicators are quite enough. No matter how many indicators to be used, broad-based participation of key stakeholders during the indicators' development is strongly recommended by past studies [17,27,29,30].

A large number of scholars and institutions proposed various indicator selection criteria [27,29,31,32]. In Tanguay et al.'s research work [31], two types of indicator selection criteria were identified: primary and secondary. The first type was planned to reduce the potential list into a feasible number and such criteria include classification, frequency of use, coverage of the main issues in tourism sustainability and measurability over time. The decision makers used the latter group of criteria to examine the applicability of indicators to specific destinations and take into consideration availability of data, compatibility with the destination policy, and validation of indicators. In others works, different authors proposed additional criteria, such as: time perspective; special focus; measurability; policy relevance [29]; relevance; fit to the Deriving forces Pressure—State—Impact—Response (DPSIR) framework; frequency of use; data availability; suitability to geographical settings; ease of understand and limited number; relevance of the indicators to the selected issue; feasibility of obtaining and analyzing the needed information; credibility of the information; clarity and comprehension to users, comparability over time and across regions [27].

Indicator ponderation is also an important aspect in the measurement of tourism sustainability, since they have a significant effect on the ranking of analyzed regions and subsequent policymaking. Due to this, consideration of relative indicators may significantly differ depending of the chosen criteria approach to obtain it. There are two types of approaches, which reflects an indicator's importance: opinion-based (subjective) and data-centric (objective) approaches. Regarding the opinion-based procedure, it generally reflects a reasonable choice, especially when those are based on profound knowledge about the region, being considered as a positive aspect [33]. The negative aspect of this procedure is the tendency to consider one intervention area more important than another and consequently, influencing the results.

Nowadays, the significance of involving stakeholders in sustainable tourism initiatives is increasingly acknowledged and recommended within both academia and practice [34]. Several research studies regarding stakeholder groups' attitudes towards tourism were already performed, often consisting of studies that explore one stakeholder group at a time [35].

In a test of a comprehensive set of indicators that would help to conduct meaningful assessment of a progress towards sustainable tourism development, using a three-round Delphi method, participants evaluate the initial list of indicators based on 6 internationally accepted indicator selection criteria. From 158 candidate indicators, only 53 were retained, since they were found to be free from the problem of multicollinearity and have good internal consistency, convergent validity, discriminant validity and construct validity. Therefore, it was recommended that broad-based participation of key stakeholders is highly important to develop good indicators that would help to make informed decisions [36]. However, when comparisons of stakeholder group's attitudes have been made, there is a dichotomy evident within the literature [37]. One part of the literature suggests that different stakeholders possess attitudes that are specific to their group [38–40]. Another part suggests that stakeholder identities do not necessarily conform to the same clusters of attitudes [41].

A compilation study also showed that the indicators of the various entities already correspond to several indicators suggested by UNWTO [27] or the European Tourism Indicator System (ETIS) [42]. However, despite the existence of several indicators for each issue, or even the need to create new indicators, it is not always possible to match expectations to reality, either because of the lack of updating data over the years or due to the lack of it.

2.2. Indicators of Sustainable Development in Tourism Regions

Since the early 1990s, UNWTO has been a pioneer in the development and application of sustainability indicators for tourism and destinations. Over the past decade, studies and workshops were held in several regions of the world, with the aim of creating an effective system to better support decision-making for tourism.

Based upon these studies and workshops carried out during this period, in more than 20 countries, as well as on the experience of 60 experts and practitioners on indicators, UNWTO published in 2004 the *Guidebook—Indicators of Sustainable Development for Tourism Destinations* [27]. This manual was designed to bring practical assistance to tourism and destination managers and to encourage them to use indicators as a structural key for sustainable tourism in their destinations.

Also in 2004, UNWTO created the International Network of Sustainable Tourism Observatories (INSTO). The main purpose of the network is to support responsible management of tourism and to improve the sustainability and resilience in the tourism sector. To do so, systematic and regular timeline surveys of tourism performance and impact are fundamental in order, to better understanding the destination-wide resources used and fostered. In 2016, the INSTO published the *Guiding Framework for Observatories* [43], which leads the establishment and functioning processes of the observatories.

In 2013, the European Commission launched ETIS [42]. This system is a management tool, created for monitoring and measuring the sustainable tourism performance of destinations, by using a common comparable approach. It is based on 27 core indicators and 40 optional indicators, subdivided into four categories:

- (1) destination management;
- (2) social and cultural impact;
- (3) economic value and
- (4) environmental impact. ETIS does not set minimum values to be achieved and does not provide any certification.

It just provides the basic information needed to monitor sustainability and to manage tourism activity more effectively. The monitoring results are based on self-assessment, observation, data collection and analysis made by the regions.

The feasibility and practicality of the ETIS system was tested through two pilot projects, over a 2-year period, in different European touristic regions. The commission, with the support of a pool of experts, analyzed this feedback and revised the system in 2015–2016 [42].

Another relevant work is the Croatian Sustainable Tourism Observatory (CROSTO), created by Institute for Tourism, in cooperation with UNWTO and a member of INSTO. CROSTO applied ETIS (as a European Union (EU) member state) with some adjustments, to fulfil the mandatory sustainability issues from UNWTO to ETIS indicators. However, the selection of indicators is conditioned from data availability and stakeholders' cooperation [44]. The project is an example of how difficult it is to implement one system of reliable indicators. The structure and indicators typology are presented in Tables 1 and 2, which demonstrate the effort of CROSTO to implement a system based in ETIS and UNWTO issues. Despite the ETIS indicators, only correspond to 8 of 9 issues from UNWTO (Table 1). The ability to implement supplemental indicators (Table 2) could improve the measurement and monitoring of tourism sustainability in Croatia. This is a real example that sometimes improving the system of indicators is mandatory to achieve results.

Table 1. List of World Tourism Organization (UNWTO) mandatory issues and corresponding European Tourism Indicator System (ETIS) indicators used by the Croatian Sustainable Tourism Observatory (CROSTO) [44].

UNWTO Mandatory Issue	Corresponding ETIS Issue		Corresponding ETIS Indicators
	ETIS Section	ETIS Criterion	
Local satisfaction with tourism	C. Social and cultural impact	C.1 Community/social impact	C1.2 Percentage of residents who are satisfied with tourism in the destination (per month/season)
Destination economic benefits	B. Economic value	B.1 Tourism flow (volume and value) at destination	B.1.1 Number of tourist nights B.1.4 Daily spending per overnight tourist
Employment		B.3 Quantity and quality of employment	B.3.1 Direct tourism employment as percentage of total employment in the destination
Tourism seasonality		B.2 Tourism enterprise(s) performance	B.2.2 Occupancy rate in commercial accommodation per month and average for the year
Energy management	D. Environmental impact	D.6 Energy usage	D.6.1 Energy consumption per tourist night compared to general population energy consumption per resident night
Water management		D.5 Water management	D.5.1 Water consumption per tourist night compared to general population water consumption per resident night
Sewage treatment		D.4 Sewage treatment	D.4.1 Percentage of sewage from the destination treated to at least secondary level prior to discharge
Solid waste management		D.3 Solid waste management	D.3.1 Waste production per tourist night compared to general population waste production per person (kg)

Table 2. List of supplemental indicators used by CROSTO [44].

UNWTO Mandatory Issue	UNWTO Baseline Indicator	Corresponding ETIS Issue		Corresponding ETIS Indicators
		ETIS Section	ETIS Criterion	
Development control	Existence of land use or development planning processes, including tourism % of destination area subject to control (density, design, among others)	-	-	-
-	-	A. Destination management	A.1 Sustainable tourism public policy	A.1.1 Percentage of tourism enterprises/establishments in the destination using a voluntary certification/labelling for environmental/quality/sustainability and/or Corporate Social Responsibility
-	-	-	A.2 Customer satisfaction	A.2.1 Percentage of tourists and same-day visitors that are satisfied with their overall experience in the destination A.2.2 Percentage of repeat/return visitors (within 5 years)

Tudorache et al. [45], argue that applying ETIS indicators is a flexible process that must be adequate for the particularities of each destination, taking into account both the needs of the stakeholders, the information that is useful to them and the periodic data available for the destination region. In addition, and in some cases, when the available indicators are insufficient, additional indicators must be incorporated and adapted to the needs and specifics of the destination.

According to the EU, it is essential that all operators in the sector combine their effort and work within a consolidated political framework, which takes account of EU priorities set out in the 'Europe 2020' strategy: Europe must remain the world's n° 1 destination, able to capitalize on its

territorial wealth and diversity [46]. Therefore, the Network of European Regions for Competitive and Sustainable Tourism (NECSTouR) emerged. NECSTouR develops a coherent framework for the coordination of regional development programs and research on sustainable and competitive tourism. It brings together 37 European regions with a strong competency in tourism, as well as, tourism-related academic organizations, such as universities and research institutes and representatives of sustainable and responsible tourism business associations and networks [34]. Since 2013, NECSTouR has been a partner in several European projects, enhancing competitive and sustainable tourism through different topics and perspectives.

A good example of an ongoing European project is the Models of Integrated Tourism in the Mediterranean Plus (MITOMED+) project. Although many Mediterranean tourism destinations have adopted local and regional integrated strategies of tourism development, there is no real governance for tourism activities at a wider transnational level, and environmental governance is still very fragmented. One of the main actions of the MITOMED+ project includes the observation and survey of tourism data indicators, allowing the measurement of the sustainability of tourism activities and their economic, social and environmental outcomes and impacts in several tourism destinations [47].

In Portugal, Tourism of Portugal is also involved in a process of developing indicators, namely Travel BI (travel identification card) [48], that aims to be a platform to support the decision-making agents in the tourism sector. The system is based on a business intelligence system, integrating information from the Tourism of Portugal and obtained by several national and international sources, and is still in development. The information is organized into three pillars of sustainability: environmental; social and economic, and includes 11 domains and 43 indicators. However, changes may occur in the structure since the project is not yet concluded.

An important project for the Algarve Region, was the SIDS Algarve—System of Indicators of Sustainable Development, developed at the beginning of 2000 [8]. The SIDS project is not operational because it depends on information that is collect by different entities who do not ensure the data for the system's continuity. Not considering this problem, the proposed framework of SIDS indicators is of high relevance. This case highlights the importance of having the data easily available or be produced in a regular basis.

3. Conceptual Framework and Research Question

3.1. Conceptual Framework

The approach applied for identification of potential indicators consists in the following main steps:

- (1) analysis of different framework indicators for sustainable development in four main domains: environmental; sociocultural; economic and institutional;
- (2) stakeholders' engagement;
- (3) definition of the system of indicators and communication system to be implemented.

At step 1, the following main activities were done:

- (1) a detail review of international and Portuguese framework indicators, namely, SIDS Algarve [8], UNWTO [27], ETIS [42], MITOMED+ [47], Travel BI [48], CROSTO [49], Portuguese National Statistical Institute (INE) [50];
- (2) systematization of the typologies of indicators;
- (3) preparation of the list of indicators;
- (4) characterization of indicators: availability (source), periodicity and presentation forms, temporal evolution, administrative division level (national, regional, local), European goals, among others;
- (5) development of a list of potential indicators and their main characteristics that meet the criteria;
- (6) proposal of indicators highlighting those that best meet the benchmarks and objectives.

The indicators are to be used by different stakeholders of the region, namely, public institutions (Algarve Region Commission, municipalities and others), economic agents (hotels, restaurants, services and others), tourists and local residents. Therefore, it was crucial to hear their opinions and involve them in the process.

Considering the influence and interest of the potential stakeholder [51], and based on a matrix analysis [52], the key players to engage in the selection process were identified (Table 3). The process included several sectorial meetings with authorities and associations, which take place between the end of 2017 and during 2018, with open discussions regarding the aspects that each agent could consider important to be monitored and also most suitable to support the selection.

Table 3. Stakeholders and main area of intervention (profile).

Stakeholder	Main Intervention Area
Health Authority (ARSA—Administração Regional de Saúde do Algarve www.arsalgarve.min-saude.pt)	Its main mission is to guarantee the population of the respective geographic area of intervention the access to health care.
Environment Portuguese Agency (APA—Agência Portuguesa do Ambiente https://www.apambiente.pt/)	Its mission is to propose, develop and monitor, on an integrated and participated manner, the public policies for the environment and sustainable development, in close cooperation with other sectoral policies and public and private entities.
Water Company (Águas do Algarve, S.A. www.aguasdoalgarve.pt)	Ensure the supply of water for human consumption and the treatment of wastewater according to the highest standards of quality and reliability.
Algarve Hotels Association (AHETA—Associação dos Hotéis e Empreendimentos Turísticos do Algarve http://94.126.169.141/~{jahetapt/wp/)	Integrates the interests of the hotels and tourist enterprises of the Region, giving expression to the diversity of the offer and the maturing of the business interests of the Algarve tourism
Tourism Industrial Association (AIHSA—Associação dos Industriais Hoteleiros, Restauração e Bebidas www.aihsa.pt)	Promotion of the interests of Hotels, Catering and Beverages Associates, being the link between private agents and the public sector.
Algarve Waste Collect and Management Enterprise (ALGAR—Valorização e Tratamento de Resíduos Sólidos S.A. www.algar.com.pt)	Ensure the recovery of waste in the most sustainable way in its various areas of operation, ensuring demanding environmental standards, exemplary social practices and value creation.
Municipal Associations of Algarve (AMAL—Comunidade Intermunicipal do Algarve http://amal.pt)	Increase the development of municipalities and strengthen the identity of the Region, through the articulation of interests and creation of synergies.
Algarve Regional Coordination and Development Commission (CCDR—Comissão de Coordenação e Desenvolvimento Regional do Algarve https://ccdr-alg.pt)	Coordinate the regional development of the Algarve.
Consumer Association ONG (DECO—Associação Portuguesa para a Defesa do Consumidor www.deco.proteste.pt)	Organization that represents and defends the Portuguese consumers.
Algarve Public Direction of Schools (DGEstE—Direção geral dos Estabelecimentos Escolares direção de serviços da região do algarve www.dgeste.mec.pt)	Ensure the implementation of education policies defined within the educational system.
Algarve Public Direction of Culture (Direção Regional de Cultura do Algarve www.cultalg.pt)	Gives continuity to the objectives of the cultural policy of the government, translating them, in the framework of its competences, to the scale of the Algarve
Water and Waste Regulator Entity (ERSAR—Entidade Reguladora dos Serviços de Águas e Resíduos www.ersar.pt)	Regulation and supervision of the sectors of public water supply to populations, urban wastewater sanitation and urban solid waste management.
Natural Conservation and Forest Public Institute (ICNF—Instituto da Conservação da Natureza e das Florestas www.icnf.pt/)	Ensure the implementation of nature conservation and forest policies, with a view to the conservation, sustainable use, valorization, enjoyment and public recognition of the natural heritage.
Employment and Training Institute (IEFP—Instituto do Emprego e Formação Profissional ... www.iefp.pt)	Is the national public employment service. Its mission is to promote the creation and quality of employment and combat unemployment.
National Statistical Institute (INE—Instituto Nacional de Estatística https://www.ine.pt)	The mission of Statistics Portugal, IP is to produce and disseminate, in an effective, efficient and independent manner, high-quality official statistical information relevant for the whole society.
Infrastructures Institute (IP—Infraestruturas de Portugal www.infraestruturasdeportugal.pt)	Company designed to manage the railway and road infrastructures in Portugal.
Police (PSP—Polícia de Segurança Pública www.psp.pt)	Public uniformed and armed security force.
Social Security (Segurança Social www.seg-social.pt)	Ensure the priority objectives of the Portuguese social security system.
Algarve Tourism (Turismo do Algarve https://www.turismoalgarve.pt)	Promote the destination; Develop and support companies; Qualifying and forming human resources; Regulate and inspect.

After the sectorial meetings, the output was very positive since it showed a convergence for the indicator domains and sub-domains, although with a wide diversity of potential indicators. Then, it was decided to provide several indicators in each sub-domain, in order to take into account the different stakeholder opinions on the next phase and to maximize their enrolment in the process.

Therefore, the conceptual framework uses the structure of domain, subdomain and indicators. Based in the methodology previously reported, 128 indicators were identified, divided into 67 environmental indicators, 36 sociocultural indicators, 18 economic indicators and 7 institutional indicators, as can be seen on the sub-domain, number (No.) and indicator columns of Tables A1–A4 (Appendix B).

3.2. Research Question

The selection process of indicators is of vital importance for the observatory's success as well as well-functioning monitoring processes in the future. Thus, it is crucial to have, not only the stakeholders' engagement in this process, but also to guarantee solid information sources, their quality, availability and representativeness.

The research question is the selection of a set of indicators that are relevant to the stakeholders and should be available and uploaded automatically in the future, on the OBSERVE platform, in order to ensure that information is from reliable and updated sources.

This paper also seeks to answer the following four questions:

- (1) Are the indicators relevant to define the trends of sustainable development in Algarve region?
- (2) Do the indicators respond to the stakeholders' strategies for a sustainable tourism development?
- (3) Is it possible to upload the data automatically from a reliable database source?
- (4) Are there limitations on the approach to answer the research question?

4. Methodology: Selection of Potential Indicators

4.1. Main Steps

The initial tasks are:

- (1) review literature and research of national and European policies;
- (2) identification and analysis of several indicators systems;
- (3) identification of pre-requirement indicators.

This cover the areas considered in national and international policies/frameworks; the potential indicators for this case study were listed and reported in Section 3.1 (conceptual framework). At this stage the main tasks are:

- Analysis of the sources of information and classify its availability;
- Preparation of a survey to assess stakeholder's options of indicators;
- Realization of an open workshop, which included a presential survey (sample A);
- Realization of an online survey (sample B);
- Selection of indicators.

4.2. Information Source and Availability

Since one of the key points of this project, is to assure the sources of information, then all the potential indicators identified were analyzed according to the availability and reliability of the source. Indicators source are classified according to:

- Available data—source and data can be accessed through an application programming interface (API) or similar (*);
- Requires protocol or advanced calculation (**);

- Information does not exist or could not be have a complete series of information (***)).

4.3. Survey

The initial proposal of the survey considered 67 environmental indicators, 36 sociocultural indicators, 18 economic indicators and 7 institutional indicators, giving references about the data availability. From those, the questionnaire asks respondents to select the most relevant indicators for each domain, choosing 12 environmental, 8 sociocultural, 8 economic and 3 institutional indicators. It also allows suggestions, comments or remarks. After the first survey, performed during the workshop, an upgraded version was made, integrating important suggestions. The online survey is presented in Appendix A.

4.4. Workshop—Stakeholders' Process Engagement

It is crucial to engage all relevant stakeholders in the decision process and ensuring coherent actions regarding, for example, the monitored issue areas, as well as the selected indicators and methodologies. So, besides the meetings, a workshop was held.

The workshop was realized on July 2018, in Faro, at the Algarve Regional Coordination and Development Commission (CCDR Algarve) and both public and private entities of the region, namely those listed in Table 3, were invited to participate. The workshop begun with the explanation of the project by the team, the sample of indicators selected to be analyzed, and critical discussion about the areas and domains. At the end, each participant was asked to complete the survey (similar to the one present in Appendix A). This sample, namely A, is of 27 answers, after validation (that are all fulfilled). The technical and decision makers that are invited and answer the survey are of regional entities of areas of tourism, other economic sectors, transport, planning, environment, cultural, social and others, what assure the view of the different areas and also able to make a relevant contribution.

From the open discussion, it was concluded that the areas and domains to be considered by OBSERVE are more relevant than the total number of indicators. Another aspect was the concern about the lack of available data regarding some important sustainable indicators. In addition, specific indications from the stakeholders led to the inclusion of other indicators on the final online survey (for example, demography aspects).

4.5. Online Survey

After the conclusion of these activities, an online inquiry was launched where it was asked to choose a set of indicators, especially those that could be more appropriate to monitor the region and the tourism sustainability. The request for collaboration in the response to the survey was disseminated electronically (email, facebook), as well as a press release and on the project's website. The survey responses, sample B, are considered representative of an enlarged group of economy, service providers and the population.

On the online inquiry, for each indicator there was also an optional explanation about the indicator's characteristics that can be see when passing or clicking on the indicator, to clarify for the user. The online survey was launched in July and closed in November 2018, and the total number of answers obtained with validation (that are all fulfilled) are 108. Completion of the survey was anonymous to avoid conditioning the responses and each participant could only answer once. The participants are representative of the region, namely, from not only public institutions, economic agents, tourists, local communities and residents.

4.6. Selection of Indicators, Discussion and Conclusion

The results of workshop (sample A) an online survey (sample B) were treated (total number of selections and percentage in each area) and analyzed separately and combined. The most selected in

the surveys allow us to understand which specific indicators could be considered for each domain and sub-domain.

After comparing the results, a critical analysis was performed by the team experts for each subdomain. The selection criteria are: avoiding redundant indicators (select not all of the indicators of a subdomain), assuring a coherent base (if possible at least one for subdomain) and selecting indicators that balance the needs of stakeholders (most selected) and the information availability (there is a usual statistical base and potential automatic process, like API). The output of this iterative process leads to the final list of OBSERVE indicators.

After this systematization, another critical analysis of the results (dual process) was performed with the stakeholders, and potential developments for the future of the indicators' structure were pointed out, as well as the assessment of research question hypothesis.

5. Results Analysis

5.1. Survey

As previously mentioned, the stakeholders were consulted in a workshop. During this session, the project was detailed and a survey was carried out with 27 valid answers. The online questionnaire was sent to a broader public and the answers were obtained, from July to November, recording 108 valid participations. In addition, during the sectorial meetings, important suggestions were reported and incorporated.

Tables A1–A4, which are in Appendix B, synthesize the inquiries' results and the data availability: (*) if it is available; (**) if requires protocol or advanced calculation; (***) if data does not exist, and the relative importance of the sub-domains, for each domain.

Sample (A) refers to the results from the survey carried out during the workshop session in CCDR Algarve and sample (B) refers to the results from the online questionnaire. The relative importance of each sub-domain is obtained by the number of times that an indicator from the respective sub-domain is chosen normalized by the total number of chosen indicators on the domain. The same methodology was applied for each indicator, but in this case, the ratio is given by the number of times that the indicator is chosen, normalized to the total number of chosen indicators belonging to the respective sub-domain.

The analysis of Tables A1–A4 shows that most of the indicators are select in both samples (A and B), namely 76% in the environment, 79% in the economic, 93% in sociocultural and 100% in the *institutional* domain (in this last case, due to the reduce number of options). **A first deduction is that there are similar indications for the selection of indicators in both samples.**

5.2. Selected Indicators

The indicators proposal summarizes the various systems analysed, aiming to highlight those that best meet the criteria defined by the project and the project location itself: a region characterized by the dynamics between the mountains and the coast. Table 4 presents the final proposal, 64 indicators divided in 25 environmental, 19 sociocultural, 15 economic and 5 institutional indicators, which resulted from the research carried out as well as a critical analysis of the surveys and contributions received at sectorial meetings with stakeholders.

The analysis of Tables A1–A4 (Appendix B) and Table 4, comparing the indicators recommended by the stakeholders with the final proposal, found that achieves 76% (A) and 54% (B) in the environmental domain, 86% (A and B) in the economic domain, 73%(A) and 67%(B) in the sociocultural domain and 50% (A and B) in institutional domain. **A second deduction is that most of the indicators recommended by the stakeholders were selected for the final proposal.**

Regarding the aspect concerning the possibility of obtaining information through available and automated data, it is possible this is accomplished for 72% of the environmental indicators, for 73% of the sociocultural indicators, for 86% of the *economic* indicators and for 100% of the institutional indicator

domains. **A third deduction is that more than 70% of the indicators are able to have information and an automated process.**

Since the final goal was to pick about 20 environmental indicators, 10 to 15 socio-cultural indicators, 10 to 15 economic indicators and 5 institutional indicators, not exceeding 55, **a fourth deduction is that it could assure a minimal base for the indicators to monitor sustainable development and tourism in the Algarve.**

Table 4. Observatory of Sustainability of the Algarve Region for Tourism (OBSERVE) indicators.

Domain	Sub-Domain	Indicator
Environmental	Climate and Climate Change	Average air temperature
		Temperature extremes (Faro)
	Environmental Management	N° beaches and marinas with blue flag
		N° bathing water and quality classes
		Municipal expenses in environment per 1000 inhabitants
	Mobility	N° embarked and disembarked passengers (Faro Airport)
		N° passenger-kilometers carried by enterprises exploring inland transportation
		N° embarked and disembarked passengers of cruise ships (Portimão Port)
		Movement of passengers in inland waterways
		N° and location of charging stations for electric vehicles
		Daily traffic on A22 and EN125
	Energy Management	Electricity consumption per inhabitant
		% gross electricity production
		Car fuel consumption per inhabitant
	Water Cycle Management	% Safe water
		Water consumption per inhabitant
		% Wastewater treated
	Materials and Waste Management	Quality indicators of the wastewater sanitation service
		% Urban waste prepared for reuse and recycling
	Natural Capital Management	Urban waste selectively collected per inhabitant
Burnt area		
Territory Management	Investments on protection of biodiversity and landscapes of municipalities	
	N° Green spaces for public use	
Sociocultural	Air Quality and Noise	% Reconstructed total area
		Air quality index
	Tourist Satisfaction	Tourists who repeat their visit to Portugal
	Wellness in Destination	Units classification (booking and TripAdvisor)
		Tourist intensity
	Pressure	Lodging capacity in hotel establishments by 1000 inhabitants
		Tourist density
	Accessibility	% accessible rooms
		N° accessible beaches
	Culture	N° cultural properties
		Expenditure on cultural heritage of municipalities
	Education	Population aged 15 and over by level of schooling
	Health Care	N° hospital beds
	Safety	Crime rate
		N° registered crimes
	Social cohesion	Regional development composite index (Cohesion)
		Beneficiaries of the social integration income
		N° secondary Houses per 100 Houses
	Demography	Resident population
		Annual population growth: total, natural and migratory
Foreign population with status of residence		

Table 4. Cont.

Domain	Sub-Domain	Indicator
Economic	Economic Impact	Gross value added of hotel establishments, restaurants and similar to the Algarve Economy
		Apparent labor productivity
		Inflation
		Corporate structure
		Per capita purchasing power
	Employment	Sectoral employment
		Employment by gender
	Seasonality	Seasonality rate
		Seasonal employees
		Establishments open all year
	Tourist Occupation	Lodging capacity in hotel establishments
		Nights in hotel establishments
		Revenue per available room (Rev Par) of hotel establishments
		Average stay in hotel establishments
		Average spending by tourists and excursionists
Institutional	Governance and Citizenship	Abstention rate
		% capital expenditure
	Innovation and knowledge	Broadband Internet accesses per 100 inhabitants
		Expenditure in research and development of institutions and enterprises
		Investment in research and development as % of GDP

6. Discussion

As previously mentioned, it is also intended to answer four questions: 1. Are the indicators relevant to define the trends of sustainable development in Algarve region? 2. Do the indicators respond to the stakeholders' strategies for a sustainable tourism development? 3. Is it possible to upload the data automatically from a reliable database source? 4. Are there limitations in the approach to answer the research questions?

6.1. Are the Indicators Relevant to Define the Trends of Sustainable Development in Algarve Region?

When comparing the results of a study [36] that uses 6 internationally accepted indicator selection criteria, with the results obtained in this project, there is total convergence in the domains and subdomains to take into account, although they treat different regions with different tourism realities. As for the indicators, there is also a convergence of the issues addressed. Of the 53 indicators suggested by Armelash [36], at least 40 are considered directly or indirectly in the OBSERVE proposal, meaning 75% of similarity. **As a fifth deduction, the other four are presented in the previous section.**

6.2. Do the Indicators Respond to the Stakeholders' Strategies for Sustainable Tourism Development?

On the survey conducted, the stakeholders considered that the majority of the indicators proposed were extremely important, and they were aware of the interconnection between them. In addition, the indicators' selection process took into account not only the ponderation obtains from the stakeholder's inquiries responses, but also indicators' availability at this moment, meaning those that are already measured and allow tangible and numerical characterization.

Regarding the indicator's presentation format, it is proposed that this should be done using graphics, charts, tables or maps, tools that best express their trend and evolution over months and/or years.

It is also extremely important to consider the spatial representation of some indicators, according to the location (cost or mountain, east or west, municipally, locally) allowing the comparison inside the region.

Although 75% of the indicators are available, nevertheless, there is 25% of indicators that are not assured today, so a sixth deduction is that not all the information useful to stakeholders is available that challenges new ways of obtaining the information, like carbon neutrality and tourism satisfaction.

6.3. *Is it Possible to Upload the Data Automatically from a Reliable Database Source?*

The big challenge of the OBSERVE project will be the data upload, in order to keep indicators updated over time, thus allowing the application of environmental and social policies that foster the Algarve region. The sustainable development of the region, considering the pressures and impacts, can only be evaluated if there is a continuous and updated flow of information. The possibility of displaying it on a free access site enables tourism managers to be proactive in identifying problems in advance and correcting them before attending a disruptive phase.

Most of the indicators selected use, as a primary source, the national statistics database, which is available and freeware. The process of collecting data, using automatic programs (API), provides almost automatic flow of information and ensures the future of OBSERVE.

Naturally, over time, other sustainable tourism indicators can and should be added, but it greatly depends of the continuous survey of these new indicators supported by reliable sources. Thus, it is possible to have evolution (e.g., normalize information using environmental and economic or social, like energy intensity). There is also a good expectation that big data procedures will allow in the future quick and immediate data actualization that could use the trend of the use of apps in tourism sector, such as Palos Sanchez et al. [11] highlight.

A seventh deduction is that the system should be dynamic and come to consider approaches such as participation, with specific validity mechanisms and big data processing processes, as referenced by other authors [53].

6.4. *Are There Limitations in the Approach to Answer the Research Questions?*

The sample's representativeness might affect the results and give mislead indications what naturally is a limitation. However, the most important stakeholders, were engaged in the process and are aware of its importance to the region.

The real proof of the indicators' relevance will be demonstrated in the future after the OBSERVE online platform is functioning by the way that stakeholders are using the platform in the decision-making process. This will be one of the future research developments.

7. Conclusions

Several stakeholders are already working to improve their performance in the search for the Algarve region's sustainability, including public administration, regional municipalities and economic agents (hotels, restaurant and other tourism services), utilities companies (roads, energy, water, wastewater and solid waste). Their search for information can provide trends and status of the region and can work in order to create strategies for a sustainable tourism performance.

The OBSERVE project's main goal is to provide environmental, economic, sociocultural and institutional indicators in order to support the decision-making process for a sustainable growth of the region, providing significant information and contributions for the tourism sector, which is the major economic sector in the region.

The selection of indicators is an essential phase and opportunity to engage stakeholders and to assure that they are useful to them. The methodology followed, during the selection process, involved a numerous set of stakeholders from the public and private sector. Formal meetings, a workshop survey and one online inquiry, used as a consultation procedure, allowed their engagement in the process and in the final decision.

The regional stakeholders represent a fundamental key in the selection process, since they are conscious of their needs and what kind of data is useful to them, and also because some of them

manage the existence and periodicity of the data available. The selection process must be flexible and take into account the specifications and peculiarities of each destination.

If the selection is essential to support the search for sustainability development and sustainable tourism in Algarve, the indicator must be balanced between the different stakeholder's needs and a critical selection which allow a coherent framework indicator and the OBSERVE objectives. Also, the monitoring process must be continuous and, therefore, the data must be available and obtained from reliable sources.

The proposed structure of sustainable indicators includes 25 environmental indicators, 19 sociocultural indicators, 15 economic indicators, and 5 institutional indicators, together 64 indicators, to assure most of the relevant information.

The final indicators list, proposed for the OBSERVE, allows a positive answer to the research question, since 75% of the selected indicators can be directly obtained, or calculated, using available and reliable source information that can be accessed through an application programming interface (API) and complemented with data mining to provide information continuity.

Despite these efforts, more data must be collected, treated and left available, in order to improve the observatory. Ancient, actual and future initiatives should unite their efforts and work together combining synergies, namely, knowledge already acquired, different points of view, and visions for the future.

The lessons learned from this process and recommendations to similar approaches and future developments are that it could be implemented in similar approaches for public administration and service providers.

The most important, practical implication, is that: this approach allows the design of a system to monitor and evaluate, the sustainability development of a region, based on indicators, that answer to the strategic needs of a system's main users (status and trends), with social and economic implications, i.e., public institutions, economic agents, tourists, local communities and residents, since they were involved in the indicators' selection process.

Author Contributions: The research conceptualization and introduction was undertaken by F.F.; the literature review by E.M.J.S., R.L., M.D.P.; the methodology by M.J.O.; the indicators list by M.D.P. and C.M.; the conceptual framework by all authors; the result analysis by F.F., M.J.O., E.M.J.S. and R.L. and the indicators' selection and conclusion by all authors. The authors would like to thank the reviewers for the suggestions.

Funding: This research was funded by financial support, from the Operational Program CRESC ALGARVE 2020 (ALG-01-0246-FEDER-027503).

Conflicts of Interest: The authors declare no conflict of interest.

Appendix A. Survey for Indicators' Selection

Appendix A.1. OBSERVE—Observatory of Sustainability of the Algarve Region for Tourism

The OBSERVE Project (Observatory of Sustainability of the Algarve Region for Tourism) aims to obtain the perspective of the regional stakeholders and population, regarding the indicators that should be considered in the project. The initial proposal takes into consideration 67 environmental indicators, 36 sociocultural indicators, 18 economic indicators, and finally 7 institutional indicators. Nevertheless, for the final project output, the indicators must reflect a compromise between different opinions, and it will only consider approximately 20 environmental indicators, 10 to 15 sociocultural indicators, 10 to 15 economic indicators, and 5 institutional indicators. In this sense, the team project would be very pleased to have your opinion, and considered your suggestions, comments and remarks. To do so, you just need to respond to the following inquiry, taking into account the limits given for each domain.

Indicators Proposal:

OB = Indicators proposed by OBSERVE Project;

TdP = Indicators proposed by the Tourism of Portugal

Data availability:

Available data; ** ** Requires protocol or advanced calculation; *** Information does not exist

Appendix A.2. Environmental Domain (Pick only 12 Indicators)

Environmental sub-domains:

CAC = Climate and climate change; GA = Environment management; GC = Carbon management; M = Mobility; GE = Energy management; GCA = Water Cycle management; GMR = Materials and waste management; GCN = Natural capital management; GT = Territory management; QAR = Air quality and noise.

1. Climate and Climate Change

- A01—Average air temperature [CAC, OB, *]
- A02—Temperature extremes (max and min) [CAC, OB, *]
- A03—Average precipitation [CAC, OB, *]

2. Environment management

- A04—N° beaches and marinas with blue flag [GA, TdP, *]
- A05—Bathing season duration [GA, OB, *]
- A06—N° bathing water and quality classes [GA, TdP, *]
- A07—Coastline evolution [GA, OB, **]
- A08—Coastal management measures [GA, OB, **]
- A09—% establishments providing environmental training to employees [GA, TdP, ***]
- A10—% establishment with certifications [GA, TdP, ***]
- A11—Environmental expenses [GA, TdP, *]
- A12—Municipal expenses in environment per 1000 inhabitants [GA, OB, *]

3. Carbon management

- A13—Carbon footprint [GC, TdP, ***]
- A14—GHG (Greenhouse Gas) emissions [GC, OB, **]

4. Mobility

- A15—% tourists using different means of transport [M, TdP, **]
- A16—Cycle routes or cycle infrastructure [M, OB, **]
- A17—Estimation of the monthly number of users in cycling routes [M, OB, **]
- A18—N° number of passengers per month of rail transport [M, OB, **]
- A19—N° rail passengers disembarked per inhabitant [M, OB, *]
- A20—N° embarked and disembarked passengers (Faro Airport) [M, OB, *]
- A21—N° passengers boarded at airports [M, OB, *]
- A22—N° passengers-kilometer carried by enterprises [M, OB, *]
- A23—N° passenger movements per port [M, OB, *]
- A24—Movement of goods (t) in ports [M, OB, *]
- A25—N° and location of charging stations for electric vehicles [M, OB, **]
- A26—Daily traffic on highway A22 and national road EN125 [M, OB, **]

5. Energy management

- A27—Direct energy consumption [M, TdP, **]
- A28—Electricity consumption per inhabitant [GE, OB, *]

- A29—Power consumption (kWh) [GE, OB, *]
 - A30—Quota of % gross electricity production [GE, OB, *]
 - A31—% establishments with low consumption systems [GE, TdP, ***]
 - A32—% establishments with energy reduction objectives [GE, TdP, ***]
 - A33—% use of energy efficiency measures [GE, TdP, ***]
 - A34—Emissions (direct energy) [GE, TdP, **]
 - A35—Emissions (electricity consumption) [GE, TdP, **]
6. Water cycle management
- A36—% establishments that optimize water consumption [GCA, TdP, ***]
 - A37—% establishments with consumption reduction objectives [GCA, TdP, ***]
 - A38—% water controlled and good quality [GCA, TdP, ***]
 - A39—% safe water [GCA, OB, *]
 - A40—water consumption per inhabitant [GCA, OB, *]
 - A41—% population served [GCA, OB, *]
 - A42—% use of water-efficient measures [GCA, TdP, ***]
 - A43—% use recycled water [GCA, TdP, ***]
 - A44—% wastewater treated [GCA, OB, **]
 - A45—Volume of wastewater treated [GCA, OB, **]
 - A46—% lodging served by sewage drainage [GCA, OB, *]
 - A47—quality indicators of the wastewater sanitation service [GCA, OB, *]
7. Materials and waste management
- A48—Urban waste collected [GMR, TdP, *]
 - A49—% urban waste prepared for reuse and recycling [GMR, OB, *]
 - A50—% Urban waste collected selectively [GMR, OB, *]
 - A51—Urban waste collected per inhabitant [GMR, OB, *]
 - A52—Urban waste selectively collected per inhabitant [GMR, OB, *]
 - A53—% establishments that make waste separation [GMR, TdP, ***]
 - A54—% establishments with environmental criteria [GMR, TdP, ***]
8. Natural capital management
- A55—Burnt area [GCN, OB, *]
 - A56—% forest cover [GCN, OB, **]
 - A57—% tourism companies that support actions for the protection, conservation and management of biodiversity and landscape [GCN, TdP, ***]
 - A58—Invasive species vs. autochthonous species [GCN, OB, **]
 - A59—N° endangered species and priority habitats [GCN, OB, **]
 - A60—Land use (vegetation) [GCN, OB, **]
 - A61—Investments on protection of biodiversity and landscapes [GCN, OB, *]
9. Territory management
- A62—N° green spaces for public use [GT, OB, **]
 - A63—% Reconstructed total area [GT, OB, **]
10. Air quality and noise
- A64—Air quality index [GAR, OB, *]
 - A65—Air quality: particles < 10 ug [GAR, OB, *]

- A66—Air quality: particles < 2,5 ug [GAR, OB, *]
 - A67—Levels of population exposed to noise [GAR, OB, **]
11. Use the space below to make comments regarding the Environmental indicators
-
-
12. Sociocultural Indicators (Pick only 8 indicators) Sociocultural sub-domains: ST = Tourist satisfaction; SR = Resident satisfaction; BED = Wellness in destination; P = Pressure; A = Accessibility; C = Culture; E = Education; CS = Health care; S = Safety; CSO = Social cohesion; D = Demography.
13. Tourist satisfaction
- S01—% tourist satisfaction [ST, TdP, ***]
 - S02—tourists who repeat their visit to Algarve [ST, TdP, ***]
14. Resident satisfaction
- S03—% satisfaction of inhabitants with tourism [SR, TdP, ***]
 - S04—% satisfaction of inhabitants with impacts of tourism [SR, TdP, ***]
15. Wellness in destination
- S05—Units classification (booking and TripAdvisor) [SED, OB, **]
16. Pressure
- S06—Tourist Intensity [P, TdP, **]
 - S07—N° tourist beds per 100 inhabitants [P, TdP, *]
 - S08—Lodging capacity by 1000 inhabitants [P, OB, *]
 - S09—Tourist density [P, TdP, **]
 - S10—Occupancy rate [P, TdP, **]
17. Accessibility
- S11—% accessible rooms [A, TdP, **]
 - S12—N° accessible beaches [A, TdP, *]
18. Culture
- S13—N° events that promote local culture [C, OB, **]
 - S14—N° zoos, botanical gardens and aquariums [C, OB, *]
 - S15—N° museums [C, OB, *]
 - S16—N° visitors of zoos, botanical gardens and aquariums [C, OB, *]
 - S17—N° visitors of museums [C, OB, *]
 - S18—N° cultural properties [C, OB, *]
 - S19—Expenditures on cultural heritage of municipalities [C, OB, *]
 - S20—Expenditures on cultural heritage of municipalities [C, OB, *]
19. Education
- S21—Population aged 15 and over by level of schooling [E, OB, *]
20. Health care
- S22—N° hospital beds [CS, OB, *]
 - S23—N° personnel employed in universal access hospitals [CS, OB, *]

- S24—N° pharmacies per 1000 inhabitants [CS, OB, *]
 - S25—N° pharmacies [CS, OB, *]
21. Safety
- S26—Crime rate [S, OB, *]
 - S27—N° registered crimes [S, OB, *]
22. Social cohesion
- S28—Regional development composite index (Cohesion) [CSO, OB, *]
 - S29—% Beneficiaries of guaranteed minimum income and social integration income [CSO, OB, *]
 - S30—Beneficiaries of the social integration income (N.º) [CSO, OB, *]
 - S31—Social Security disability subsidy allowance [CSO, OB, *]
 - S32—N° personnel employed in hotel establishments [CSO, OB, *]
 - S33—N° secondary houses per 100 houses [CSO, OB, *]
23. Demography
- S34—Resident population [D, OB, *]
 - S35—Annual population growth: total, natural and migratory [D, OB, *]
 - S36—Foreign population with status of residence [D, OB, *]
24. Use the space below to make comments regarding the Sociocultural indicators
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-
25. Economic Domain (Pick only 8 indicators) Economic sub-domains: IE = Economic impact; E = Employment; S = Seasonality; OT = Tourist occupation.
26. Economic impact
- E01—Gross value added of hotel establishments, restaurants and similar to the Algarve Economy [IE, OB/TdP, *]
 - E02—Apparent labour productivity [IE, OB, *]
 - E03—Use of local products [IE, TdP, ***]
 - E04—Inflation [IE, OB, *]
 - E05—Corporate structure [IE, OB, *]
 - E06—Per capita purchasing power [IE, OB, *]
27. Employment
- E07—Sectoral employment [E, TdP, *]
 - E08—Employment by gender [E, TdP,*]
28. Seasonality
- E09—Seasonality rate [S, TdP, *]
 - E10—Seasonal employees [S, TdP, *]
 - E11—Establishments open all year [S, TdP, ***]
29. Tourist occupation
- E12—Lodging capacity in hotel establishments [OT, OB, *]
 - E13—Nights in hotel establishments [OT, OB, *]

- E14—Revenue per available room (Rev Par) of hotel establishments [OT, OB/TdP, *]
 - E15—Average stay in hotel establishments [OT, TdP, *]
 - E16—Tourist intensity [OT, OB, *]
 - E17—Number of tourists and excursionists [OT, TdP, ***]
 - E18—Average spending by tourists and excursionists [OT, TdP, ***]
30. Use the space below to make comments regarding the Economic indicators
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-
31. Institutional Domain (Pick only 3 indicators) Institutional sub-domains: GC = Governance and citizenship; IC = Innovation and knowledge
32. Governance and citizenship
- I01—Abstention rate [GC, OB, *]
 - I02—Public consultation processes EIA and others [GC, OB, **]
 - I03—% Capital expenditure [GC, OB, *]
33. Innovation and knowledge
- I04—Broadband internet accesses per 100 inhabitants [IC, OB, *]
 - I05—N° Hotspots Wi-Fi [IC, OB, **]
 - I06—Expenditure in research and development of institutions and enterprises [IC, OB, *]
 - I07—Investment in research and development as % of GDP [IC, OB, *]
34. Use the space below to make comments regarding the Institutional indicators
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-

* For each indicator there is also a brief explanation (in Portuguese) what is the indicator and how is estimated.

Appendix B. Inquiries Results

Table A1. Environmental domain.

Sub-Domain	Relative Relevance in the Domain		No.	Indicator	Data Availability	Relative Relevance in the Sub-Domain	
	(A)	(B)				(A)	(B)
Climate and climate change	7%	7%	A01	Average air temperature	*	54%	37%
			A03	Temperature extremes	*	27%	32%
			A02	Average precipitation (max and min)	*	19%	31%
Environment management	18%	14%	A04	N° Beaches and marinas with blue flag	*	26%	16%
			A12	Municipal expenses in Environment per 1000 inhabitants	*	16%	12%
			A07	Coastline evolution	**	13%	17%
			A06	N° Bathing water and quality classes	*	11%	12%
			A10	% Establishment with certifications	***	10%	7%
			A05	Bathing season duration	*	8%	8%
			A11	Environment expenses	*	8%	7%
A08	Coastal management measures	**	6%	14%			
A09	% Establishments providing environmental training to employees	***	2%	7%			
Carbon management	3%	4%	A13	Carbon footprint	***	67%	51%
			A14	GEE emissions	**	33%	49%

Table A1. Cont.

Sub-Domain	Relative Relevance in the Domain		No.	Indicator	Data Availability	Relative Relevance in the Sub-Domain	
	(A)	(B)				(A)	(B)
Mobility	21%	16%	A20	N ^o Embarked and Disembarked Passengers (Faro Airport)	*	17%	12%
			A26	Daily traffic on A22 and EN125	**	17%	11%
			A16	Cycle routes or Cycle Infrastructure	**	13%	16%
			A25	N ^o and location of charging stations for electric vehicles	**	8%	9%
			A22	N ^o Passengers-kilometer carried by enterprises exploring inland transportation	*	8%	7%
			A21	N ^o Passengers boarded at airports	*	7%	7%
			A19	N ^o Rail passengers disembarked per inhabitant	*	7%	6%
			A18	N ^o Number of passengers per month of rail transport	**	6%	10%
			A23	N ^o Passenger movement per port	*	6%	4%
			A24	Movement of goods (t) in ports	*	6%	4%
			A15	% Tourists using different means of transport	**	4%	10%
			A17	Estimation of the monthly number of users in cycling routes	**	3%	5%
			Energy management	10%	11%	A28	Electricity consumption per inhabitant
A30	Q% Gross Electricity Production	*				19%	7%
A27	Direct energy consumption	**				11%	13%
A29	Power consumption (kWh)	*				11%	11%
A34	Emissions (direct energy)	**				8%	9%
A33	% Use of energy efficiency measures	***				6%	16%
A31	% Establishments with low consumption systems	***				6%	10%
A32	% Establishments with energy reduction objectives	***				6%	9%
Water Cycle management	13%	18%	A39	% Safe water	*	34%	8%
			A47	Quality indicators of the wastewater sanitation service	*	15%	7%
			A40	Water consumption per inhabitant	*	11%	12%
			A36	% Establishments that optimize water consumption	***	9%	11%
			A43	% Use recycled water	***	9%	9%
			A38	% Water controlled and good quality	***	6%	13%
			A44	% Wastewater treated	**	6%	9%
			A41	% Population served	*	4%	7%
			A37	% Establishments with consumption reduction objectives	***	2%	6%
			A45	Volume of wastewater treated	**	2%	5%
			A46	% Lodging served by sewage drainage	*	2%	5%
			A42	% Use of water-efficient measures	***	0%	8%
Materials and waste management	7%	10%	A49	% Urban waste prepared for reuse and recycling	*	26%	20%
			A53	% Establishments that make waste separation	***	22%	12%
			A50	% Urban waste collected selectively	*	22%	11%
			A52	Urban waste selectively collected per inhabitant	*	22%	11%
			A48	Urban waste collected	*	4%	20%
			A54	% Establishments with environmental criteria	***	4%	12%
			A51	Urban waste collected per inhabitant	*	0%	13%
Natural capital management	9%	10%	A55	Burnt area	*	40%	22%
			A61	Investments on protection of biodiversity and landscapes of municipalities	*	20%	15%
			A57	% Tourism companies that support actions for the protection, conservation and management of biodiversity and landscape	***	13%	16%
			A60	Land use (vegetation)	**	10%	13%
			A59	N ^o Endangered species and priority habitats	**	10%	10%
			A58	Invasive Species vs Autochthonous Species	**	3%	13%
			A56	% Forest cover	**	3%	11%
Territory management	5%	4%	A62	N ^o Green spaces for public use	**	76%	58%
			A63	% Reconstructed total area	**	24%	42%
Air quality and noise	7%	6%	A64	Air Quality Index	*	58%	53%
			A67	Levels of population exposed to noise	*	17%	24%
			A66	Air Quality: Particles < 2,5 ug	*	13%	13%
			A65	Air Quality: Particles < 10 ug	*	13%	10%

Legend: * Available data; ** Requires protocol or advanced calculation; *** Information does not exist; (A) Stakeholders participation on July 13, 2018; (B) Online questionnaire.

Table A2. Sociocultural domain.

Sub-Domain	Relative Relevance in the Domain		No.	Indicator	Data Availability	Relative Relevance in the Sub-Domain	
	(A)	(B)				(A)	(B)
Tourist satisfaction	10%	9%	S01	% Tourist satisfaction	***	64%	53%
			S02	Tourists who repeat their visit to Portugal	***	36%	47%
Resident satisfaction	7%	8%	S03	% Satisfaction of inhabitants with tourism	***	50%	56%
			S04	% Satisfaction of inhabitants with impacts of tourism	***	50%	44%
Wellness in destination	5%	3%	S05	Units classification (booking and tripadvisor)	**	100%	100%
Pressure	13%	14%	S06	Tourist Intensity	**	36%	27%
			S09	Tourist Density	**	18%	26%
			S07	N° Tourist beds per 100 inhabitants	*	18%	14%
			S08	Lodging capacity in hotel establishments by 1000 inhabitants	*	18%	13%
			S10	Occupancy rate	**	11%	20%
Accessibility	8%	7%	S12	N° Accessible beaches	*	78%	69%
			S11	% Accessible rooms	**	22%	31%
Culture	18%	15%	S13	N° Events that promote local culture	**	31%	29%
			S19	Expenditures on cultural heritage of municipalities	*	18%	18%
			S18	N° Cultural properties	*	15%	12%
			S20	Expenditures on cultural heritage of municipalities	*	10%	11%
			S14	N° Zoos, botanical gardens and aquariums	*	10%	5%
			S15	N° Museums	*	8%	10%
			S17	N° Visitors of museums	*	5%	9%
			S16	N° Visitors of zoos, botanical gardens and aquariums	*	3%	6%
Education	6%	4%	S21	Population aged 15 and over by level of schooling	*	100%	100%
Health care	10%	11%	S22	N° Hospital beds	*	67%	49%
			S23	N° Personnel employed in universal access hospitals	*	14%	22%
			S24	N° Pharmacies per 1000 inhabitants	*	10%	18%
			S25	N° Pharmacies	*	10%	10%
Safety	10%	8%	S26	Crime rate	*	67%	74%
			S27	N° Registered crimes	*	33%	26%
Social cohesion	13%	11%	S28	Regional development composite index (Cohesion)	*	39%	39%
			S33	N° Secondary Houses per 100 Houses	*	21%	19%
			S30	Beneficiaries of the social integration income	*	14%	7%
			S32	N° Personnel employed in hotel establishments	*	11%	13%
			S29	% Beneficiaries of guaranteed minimum income and social integration income	*	7%	15%
Demography	-	11%	S31	Social Security disability subsidy allowance	*	7%	7%
			S34	Resident population	*	-	43%
			S35	Annual population growth: total, natural and migratory	*	-	30%
			S36	Foreign population with status of residence	*	-	27%

Legend: * Available data; ** Requires protocol or advanced calculation; *** Information does not exist; (A) Stakeholders participation on July 13, 2018; (B) Online questionnaire.

Table A3. Economic domain.

Sub-Domain	Relative Relevance in the Domain		No.	Indicator	Data Availability	Relative Relevance in the Sub-Domain	
	(A)	(B)				(A)	(B)
Economic impact	35%	35%	E01	Gross value added of hotel establishments, restaurants and similar to the Algarve Economy	*	36%	28%
			E06	Per capita purchasing power	*	14%	15%
			E02	Apparent labor productivity	*	14%	12%
			E05	Corporate structure	*	13%	12%
			E03	Use of local products	***	12%	18%
E04	Inflation	*	10%	15%			
Employment	9%	12%	E07	Sectoral employment	*	82%	77%
			E08	Employment by gender	*	18%	23%
Seasonality	15%	18%	E09	Seasonality Rate	*	47%	45%
			E10	Seasonal employees	*	27%	35%
			E11	Establishments open all year	***	27%	20%
Tourist occupation	41%	36%	E14	Revenue per available room (Rev Par) of hotel establishments	*	20%	19%
			E12	Lodging capacity in hotel establishments	*	18%	18%
			E13	Nights in hotel establishments	*	15%	12%
			E16	Tourist Intensity	*	14%	11%
			E18	Average spending by tourists and excursionists	***	13%	17%
			E15	Average stay in hotel establishments	*	10%	14%
E17	Number of tourists and excursionists	***	10%	8%			

Legend: * Available data; ** Requires protocol or advanced calculation; *** Information does not exist; (A) Stakeholders participation on July 13, 2018; (B) Online questionnaire.

Table A4. Institutional domain.

Sub-Domain	Relative Relevance in the Domain		No.	Indicator	Data Availability	Relative Relevance in the Sub-Domain	
	(A)	(B)				(A)	(B)
Governance and citizenship	38%	36%	I01	Abstention rate	*	42%	47%
			I02	Public consultation processes EIA and others	**	31%	31%
			I03	% Capital expenditure	*	27%	22%
Innovation and knowledge	62%	64%	I07	Investment in research and development as % of GDP	*	37%	30%
			I06	Expenditure in research and development of institutions and enterprises	*	35%	29%
			I05	N° Hotspots Wi-Fi	**	16%	18%
			I04	Broadband Internet accesses per 100 inhabitants	*	12%	23%

Legend: * Available data; ** Requires protocol or advanced calculation; *** Information does not exist; (A) Stakeholders participation on July 13, 2018; (B) Online questionnaire.

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