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Bridging the science-policy gap in sustainable tourism: evidence from a multiple case study analysis of UNWTO INSTO sustainable tourism observatories

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ABSTRACT

While monitoring sustainable tourism (ST) has become popular in the twenty first century, a clear implementation gap has been acknowledged worldwide. This paper argues that the inadequate implementation might be linked to a knowledge gap on procedures, approaches and instruments to operationalise evidence-informed destination management. Indeed, the routines and procedures to run an inter-institutional adaptive management cycle at the interface between research organisations and the tourism ecosystem are mostly unknown. Based on the identified science-policy gap, this paper addresses the role of the UNWTO INSTO observatories as innovative catalysts to co-create an adaptive transformation of the tourism system, i.e. to bridge indicator-based knowledge production on sustainability performance, knowledge transfer and knowledge use, and to foster concrete actions and a transformation at any level. The catalytic role of INSTO observatories is explored by means of an exploratory and qualitative study. A multiple case study was conducted on selected observatories (Guanajuato in Mexico, Algarve in Portugal, Sleman in Indonesia) to capitalise on the individual experiences and identify strengths and challenges of different approaches to evidence-informed decision-making procedures. Lessons learnt from the case studies shed light on possible strategies to fill the science-policy gap and foster mutual learning at INSTO level and beyond.

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Introduction

The need for monitoring and reporting on sustainable tourism (ST) has been highlighted by advocates since the end of the last century (e.g. WCST [The World Conference on Sustainable Tourism], 1995) and theorised in the following decade (e.g. Miller, 2001; UNWTO [World Tourism Organization], 2004). After almost 30 years of debate, both tourism scholars and practitioners have gained extensive experience in setting ST measurement standards (Gasparini & Mariotti, 2023; Hsu et al., 2020) and in creating guidelines for scoping, fine-tuning, and classifying indicators (Miller & Twining-Ward, 2005). However, a clear implementation gap related to a missing or underdeveloped connection between ST monitoring through indicators, policy and practice

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has been identified worldwide (UNWTO., 2017). This implementation gap might be linked to a knowledge gap on procedures, approaches, and instruments to operationalise evidence-informed destination management. Indeed, while the responsibility of setting targets or critical limits is typically shared among tourism stakeholders (Miller & Twining-Ward, 2005), the routines and collaborative procedures to run an inter-institutional adaptive management cycle are mostly unknown. The aforementioned implementation gap is not only specific to tourism, but is rather a common weakness in the science-practice relationship in many sectors, to the point that knowledge management studies refer to it by the term "two communities theory" (Caplan, 1979; Wingens, 1990). This refers to the barrier between producers and consumers of research evidence, partly due to the fact that academic incentive systems do not foster and attribute value to scientific knowledge transfer towards practical applications (Gray et al., 2014). In this paper, we refer to scientific knowledge as the result of any empirical study using academic quality standards and formalised processes (Raymond et al., 2010). Further, we recognise the use of indicators as a relevant (although not unique) instrument to provide scientific knowledge about sustainability performance in tourism (Miller & Twining-Ward, 2005) and we refer to practical applications to indicate the use of evidence in public policy, with particular reference to an instrumental utilisation at the local (destination) level (Caplan, 1979).

Based on the identified gaps and leveraging existing scientific knowledge on how to bridge the gap between evidence creation and implementation, this paper addresses the role of the UNWTO INSTO—International Network of Sustainable Tourism Observatories—as an innovative catalyst to co-create a concrete and adaptive tourism system transformation and to foster the research-to-action process. Academic research on INSTO observatories' catalytic function is still at an early stage (Ryan et al., 2019). However, their potential to transform Destination Management Organisations (DMOs) into agents of sustainable development and governance is high, as—based on UNWTO guidelines—INSTO observatories must set up a collaborative platform for monitoring and implementation that includes research institutions and DMOs. After 18 years of INSTO's activity worldwide, the present study offers a critical assessment of the progress made and the operational difficulties encountered at local and global level. The main aim is to reflect on ways to transform knowledge production on sustainability performance into concrete actions to foster a transformative process at any level, paving the way for evidence-informed destination management. The catalytic role of INSTO observatories is explored through a qualitative study, including documentary analysis and expert interviews. Multiple case study research on three Sustainable Tourism Observatories (STOs) of the UNWTO network—Guanajuato in Mexico, Algarve in Portugal, Sleman in Indonesia—help to critically reflect on and leverage their experiences and provide novel insights into collaborative evidence-based decision-making.

The structure of the paper is as follows: the theoretical framework sheds light on the different approaches to connect research and action using evidence-based practice (EBP) and knowledge production/utilisation theories (KPU). Further, it links the EBP and KPU theories to the existing literature about evidence creation and its use in ST. The three case studies are then introduced from a methodological perspective, before highlighting the main results in terms of a comparative analysis. Next, the discussion of the results emphasises important achievements and challenges regarding the use of sustainability performance knowledge at different levels. Finally, the conclusion summarises the main insights and implications of the study, thereby also paving the way for future research about knowledge use in sustainability science.

Theoretical framework: connecting research to action and bridging the science-policy gap

Connecting research to action is a major challenge, especially in the social sciences. The more is known about the use of scientific evidence in policy, the more it becomes evident that "[m]

ore knowledge is produced than ever makes an impact on practice, and even when it does, there tends to be a huge time lag between the generation and use of knowledge" (Gray & Schubert, 2012: 211). What is more, "the production of knowledge by itself is not enough to guarantee transfer, implementation and utilisation" (Ibid.). In the following section, the research-to-action process is analysed to better understand science use and later critically assess the role of INSTO observatories in bridging the science-policy gap.

Connecting research to action in the social sciences

The literature on science utilisation identifies at least three steps to connect evidence to action: *knowledge production*, *knowledge transfer/translation* and *knowledge use/utilisation* (Gray et al., 2014). The first step refers to the ability—normally attributed to the researcher—to produce empirical findings; the second regards the identification and creation, sometimes by third parties (Gray & Schubert, 2012), of communication products or fit-for-purpose information (Rigby, 2005) to transfer these research outcomes and increase their accessibility, relevance or usability for the target users; finally, the third refers to the knowledge take-up by non-scientists, e.g. the introduction of hard and soft policy measures and the definition of decisions at individual, interpersonal or business levels (Graham et al., 2006). Based on Landry et al. (2001), knowledge utilisation happens following six sequential stages: the *transmission* of the research outcomes to practitioners; the comprehension ("*cognition*") of that content by the target audience; the *reference* to the content in their reports, policies and strategies; the *effort* made by practitioners to adopt the results; the effective *influence* on their behavioural choices; and, ultimately, the *application* of the outcomes to practice. The application by affected stakeholders varies from the instrumental use (direct application in practice) to the conceptual utilisation (new mindsets) or symbolic use (superficial endorsement) (Gray et al., 2014).

For a long time, the steps connecting research and action were understood as part of a rational, linear, and mechanistic process (Louth, 2011). Only recently a complexity-based approach has emerged to better understand the role of collective actions and policy contexts in shaping governmental acts and initiatives (Morçöl, 2012). The linear vs. complexity-based approaches indirectly recall the dichotomy between Mode 1 and Mode 2 science views, two perspectives of knowledge creation introduced in the book "The New Production of Knowledge" by Gibbons et al. (1994). Mode 1 is a discipline-based mode of knowledge creation which is natural science-driven, rational, and linear. Conversely, Mode 2 is the practice-oriented and collaborative mode; it is interdisciplinary, flexible, and engaged with practical outcomes. Gibbons et al. (1994) purportedly observed a shift from traditional Mode 1 research to Mode 2, the latter being aimed at creating knowledge for practical use through a partnership between researchers and practitioners rather than producing scientific knowledge in a more classical way (Hessels & van Lente, 2008). More recently, Mode 2 has been linked to the emergence and development of inter- and transdisciplinary fields like sustainability science (Thorén & Breian, 2016).

Interpreting science as a result of collaborative practice or of strict academic work makes a difference when it comes to the study of science utilisation. Indeed, two types of discourse in the literature on the use of science have emerged to conceptualise the research-to-action loop: the "evidence-based practice" (EBP) discourse and the "knowledge production/utilisation" (KPU) discourse (Gray et al., 2014). Both refer to the way outcomes are produced and utilised by means of academic work. While the two discourses do not constitute complete opposites, they display some notable differences that reflect two distinctive research-to-action processes which somewhat resemble the distinction between Mode 1 and Mode 2 processes of knowledge production. Indeed, the EBP approach is more rooted in a Mode 1 type of research, whereas KPU relies more on a Mode 2 way of thinking.

EBP is developed from the field of evidence-based medicine (Sackett et al., 1996) and adopts a "push" model of research transfer to practice (Cooper & Levin, 2010). This means that academics choose their topics of analysis based on their interest and the scientific relevance, without necessarily considering stakeholder needs. The research use is instrumental and based on formal efforts to transfer the results efficiently. Thereby, the dissemination happens in a linear way and there is no occasion for a co-production of results, as scientific evidence is simply transmitted to the audience. Conversely, the KPU discourse involves industry and service partnerships in the knowledge creation phase, focussing also on the organisational context of the research-user world. The research agenda is generated *with* the affected stakeholders ("user pull" model), as the knowledge produced is intended to be socially relevant and to serve the communities it is directed at (Brown, 2012). The knowledge production and consumption continuum are thereby shaped by both academic and non-academic actors that collaborate to ensure practical relevance from the early stages of research design to the final utilisation phase. Together, they find ways to translate (rather than to transfer) relevant research outcomes for interested stakeholders, while dissolving rather than bridging the science-policy gap (Gray et al., 2014). However, within EBP discourses, more recent contributions have also emphasised the fact that processes of gathering, assessing, and using evidence are less straightforward than often assumed, and are inherently political. In fact, as Parkhurst (2016) argues, evidence does not "speak for itself" but is intimately bound up with political processes involving trade-offs as well as differing values and interests. This is particularly true in the context of policy fields addressing complex social phenomena, where social norms and values are always contested. Nonetheless, in the KPU model, the distinction between the "two communities" of science and practice is less perceptible than in the EBP model, because of its explicit aims to foster bidirectional communication and a collaborative form of knowledge production which is likely to facilitate mutual understanding and trust. Furthermore, frequent interactions among stakeholders (e.g. meetings, networking activities, partnerships) as well as the identification and use of knowledge brokers facilitate the collaborative process and improve the usability of results (Moore et al., 2011). In this context, the "relevance" of the research content is considered a necessary but not sufficient condition to enable transfer and permit research uptake, as "'knowledge utilisation depends much more heavily on factors regarding the behaviour of the researchers and the users" context, than on the attributes of the research product' (Landry et al., 2001, p. 333, as cited in Gray & Schubert, 2012, p. 210). Conventionally, the KPU mode of science implementation has thereby placed much more emphasis on the organisational context of the decision-making process, the relationships among researchers and practitioners, as well as on the organisational culture of practitioners than the EBP mode. Yet, this is currently changing, as the EBP discourse is also increasingly engaging with the crucial role of organisational factors as facilitators and barriers to research utilisation within user communities. For Gray et al. (2014) this constitutes an important point of convergence between the two modes of science. Another indication of convergence is that the EBP discourse is increasingly considering the complexity of the research-to-action process, mediating relationships—e.g. involving "knowledge brokers" (Meyer, 2010) or "champions" of research within practice organisations—and time.

In the following, the two approaches illustrated above are broken down to assess the science-policy gap in tourism, understanding the use of the EBP and KPU frameworks in monitoring schemes for sustainable development.

Bridging the science-policy gap in ST: knowledge production, transfer/translation, and use/utilisation

The poor implementation of sustainability practice in the travel and tourism sector is driven by certain distinctive characteristics of the industry, which render it distinct from other economic

sectors (Coghlan, 2019). Among these specific and unique features, the most relevant are the need for close cooperation between the private and public sector in the creation of sustainable products, the different geographical scales involved in tourism offers, the inseparability of tourism production and consumption, and, finally, the fragmented and dynamic structure of the sector. These issues indicate a need for technical and scientific evidence, but also specific knowledge about the territorial features of tourism phenomena, as territorial attachment is a distinctive feature of tourism (Kofler et al., 2018).

To tackle these multilevel and multifaceted features of sustainable tourism, "[i]ndicators of sustainable development need to be developed to provide solid bases for decision-making at all levels and to contribute to a self-regulating sustainability of integrated environment and development systems" (UN [United Nations], 1992). This statement from Agenda 21 (Chapter 40, Art. 4) was the first milestone for sustainability monitoring explicitly considering sustainability indicators as necessary evidence providers for policymaking. Only three years later, in 1995, during the World Conference on Sustainable Tourism in Lanzarote, the importance of monitoring was recognised for the tourism sector, as Statement 15 from the Charter reports "The travel industry, together with bodies and NGOs whose activities are related to tourism […] shall monitor achievements, report on results and exchange their experiences." (WCST., 1995). To foster such platforms for exchange and mutual learning, the UN and its agencies, with the commitment of the 193 United Nations Member States, have set up an intergovernmental mandate to accelerate the shift to sustainable consumption and production called the "10-Year Framework of Programmes on Sustainable Consumption and Production (10YFP)." ST, as part of this programme, was later considered a relevant field for action, as it was felt it has the potential to mobilise other related industries and shape consumer behaviour for the better.

Intergovernmental organisations, research institutions, NGOs, and some innovative players in the tourism industry have taken action since then to initiate the transformation towards more sustainability. Among the practice-oriented initiatives of UNWTO that combine monitoring and policy making is the recent Glasgow Declaration on Climate Action in Tourism, presented at the Glasgow Climate Change Conference (COP 26) in 2021, as well as the collaborative platform to track the implementation of the Sustainable Development Goals (SDGs) "tourism4SDGs" (tourism4sdgs.org) and, most importantly, the initiative of the International Network of Sustainable Tourism Observatories INSTO (insto.unwto.org). There is a clear mandate from UNWTO about how to *produce* knowledge about sustainability performance, thanks to the UNWTO Guidebook for the creation of ST indicators (UNWTO., 2004). After identifying a very comprehensive list of monitoring fields (40 issues), the handbook collects more than 500 indicators, advocating for a stakeholder-driven and adaptive measurement procedure for destinations and businesses. Indicators are interpreted as catalysts to start a dialogue with relevant stakeholders and trigger a systematic planning process (UNWTO., 2004, p. 15). While providing massive (and still up-to-date) support for knowledge production on sustainability performance, the guidebook only briefly addresses the knowledge transfer activities and the knowledge use in practice (e.g. public reporting, certification schemes, definition of carrying capacities). Although relying on stakeholder participation and acknowledging some kind of complexity patterns in implementation, the view on evidence utilisation seems to be quite rational and linear, responding to the standards of EBP.

The almost simultaneously published book "Monitoring for a sustainable tourism transition. The challenge of developing and using indicators" (Miller & Twining-Ward, 2005) represents a second milestone in the ST monitoring literature and mostly addresses methodological aspects of indicator development. Based on this approach, knowledge production on sustainability performance results overall in the creation, aggregation, and communication of indicator-driven information sets, relying on secondary or primary data, but *also* on stakeholder engagement. The authors advocate for a shared "knowledge platform" (see also Jafari, 2001) on the specific (and local) features of sustainability performance, at the interface between science-based and stakeholders' practical knowledge. This approach to monitoring and implementation is not

strictly mechanistic, but rather complexity-informed (Farrel & Twining-Ward, 2005; Faulkner & Russel, 1997; McKercher, 1999) and based on adaptive management circles (Clark, 2002). In more recent contributions, the complexity-based approach is further conceptualised. Miller and Torres-Delgado (2023) argue that indicators only enable "a heuristic to managing a complex problem" (p.2) and at the same time they ensure more credibility and trust towards political actors and decision-makers in general. Within this context, it is also argued that a good balance should be kept between science-based and stakeholders' knowledge, to avoid the risk that decision-makers are de-skilled and subordinated to data managers' outcomes or results (Miller & Torres-Delgado, 2023) or the opposite risk of conflicts of interest and conflicting timelines with policymakers' agendas (Moniche & Gallego, 2023). For this reason, the dynamics between knowledge producers and users should be further explored, with the role of DMOs as entities able to absorb and transform data-driven knowledge appearing crucial (Font et al., 2023). Because the inter-institutional science-action dynamics are based on a sort of incremental learning process relying on the results of previous operational experience, this approach is closer to the previously mentioned KPU discourse, postulating a blurred distinction between knowledge producers and users. Data collection, indicator determination, and data ownership might involve local residents, regional policymakers and expert panels, with the advantage of enabling empowerment and increasing the sense of agency of local actors. However, ensuring a certain level of methodological solidity and academic independence of the science-based knowledge is fundamental for the scientific community to guarantee reliable results.

When it comes to sustainability assessment in tourism, Miller and Twining-Ward (2005) identify six main steps (cf. Figure 1) which are part of three general phases: the *development* of indicators, including a planning, a scoping, a fine-tuning, and a monitoring phase; the *interpretation* of results using benchmarking or aggregation patterns as well as communication strategies; and finally the *implementation of change*. The main difference between the UNWTO Guidebook (UNWTO., 2004) and this book is the conceptualisation of adaptive cycles and management response strategies to activate feedback loops and continuously improve the monitoring schemes. However, even in this cornerstone of the literature on ST monitoring, only a few pages are reserved for the knowledge transfer activities and for the research uptake from practitioners. When it comes to the implementation of change, reference is made to "an experiential learning cycle" (Miller & Twining-Ward, 2005, p.168) aimed at searching for and evaluating the effectiveness of alternative policy responses and thereby assessing the policy contribution to system behaviour. This is the essence of adaptive management (AM), which has proven to be a valuable tool to bridge the gap between indicator results and management responses, while also

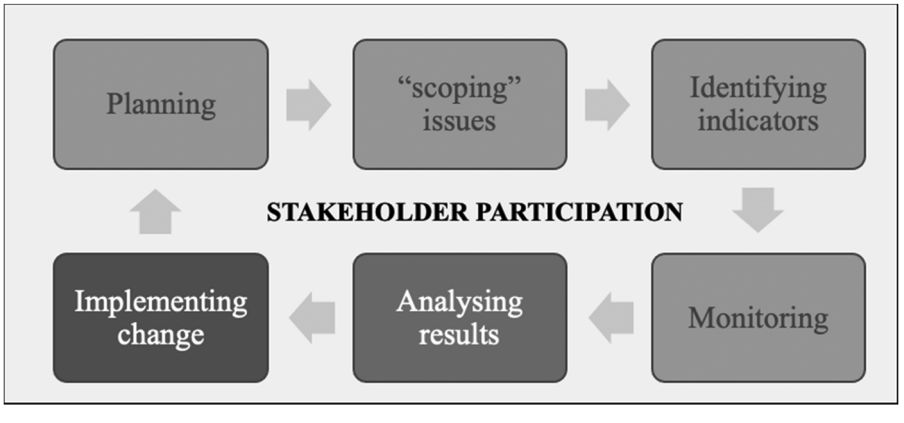

Figure 1. The knowledge creation, transfer, and implementation to assess sustainability in tourism. Own elaboration based on Miller and Twining-Ward (2005).

improving the learning outcome of the monitoring process (Twining-Ward & Tuailemafua, 2004). Having been developed in the early 1970s in the context of the management of environmental resources (Holling, 1978), AM is particularly suited in the context of non-linear complex systems characterised by high levels of uncertainty. It is conventionally defined as a "cyclical process for assessing and designing alternative ways to meet management objectives, implementing management alternatives, monitoring the achievement of objectives, evaluating results, and adjusting management actions" (Cajiao et al., 2021). In this dynamic and iterative process involving trial and error, along with continuous monitoring and the use of modelling frameworks, stakeholder participation is also considered to be of crucial importance (Schreiber et al., 2004). In fact, as Miller and Twining-Ward (2005) stress, AM provides a useful framework for stakeholder participation in the management of ST, encouraging social learning among the groups involved and thereby also the transfer of both implicit and explicit knowledge.

After almost twenty years of research and a series of relevant academic contributions on methodological and content features of ST indicators (see, e.g. Castellani & Sala, 2010; Hsu et al., 2020; Kristjánsdóttir et al., 2018; Rasoolimanesh et al., 2023; Torres-Delgado & Saarinen, 2014; Torres-Delgado & Palomeque, 2014, 2018), some scholars ultimately acknowledged the limited and merely superficial research uptake of the evidence created through indicators in tourism policy and practice (Gasparini & Mariotti, 2023; Crabolu, 2021). However, it is argued that the reason for this failure is not the nature of the indicators themselves, but rather the linear interpretation of the potential change produced (Crabolu, 2021; Crabolu et al., 2023), as well as the lacking focus on absorptive capacities of local DMOs (Font et al., 2023). In other words, the EBP-related linear and rational way of thinking and the interpretation of indicators as positivistic instruments (King, 2016, as cited in Crabolu, 2021) have created unrealistic expectations for the implementation of research at destination level which are not being met.

In this regard, some isolated contributions about evidence-informed ST in transport policies (e.g. Scuttari et al., 2019; Scuttari et al., 2021) have confirmed that the generation of evidence and its effective communication according to the standards of Mode 1 science is per se useful but not sufficient to enable successful research uptake (see also Parkhurst, 2016). Indeed, evidence creation and communication, even if "user pulled," might lead to lock-in or paradoxical situations during or after implementation, possibly caused by insufficient local support due to a missing value structure or a lack of acceptance of the regulations or innovations introduced (Scuttari et al., 2016). The involvement of regional actors and stakeholders and the active participation of the entire ecosystem in the monitoring and policy design—according to the principles of Mode 2 science—thereby appears at least as important as the quality of monitoring outcomes (Scuttari et al., 2021). Further, the role of knowledge brokers such as intermediaries—that have proven to be key players when it comes to innovation networks in tourism (Kofler et al., 2018)—should be further explored in the sustainability context, as they might inform both the EBP and the KPU approaches.

A complexity-driven approach can also be applied to the design of policy interventions. This has been shown in past academic research on ST transport (Holding, 2001), pointing out that policy bundles or mixes are more effective than single policy instruments, because they can assess multifaceted problems adopting more sophisticated compensation measures aimed at balancing stakeholders' interests and ensuring long-term success.

In line with the co-creation and complexity-based strategies mentioned previously, Crabolu (2021) identifies additional leverage points and enabling conditions to trigger better implementation procedures and accelerate successful research uptake: the assessment of the local needs, the focus on small and simple issues at the beginning, the use of peer pressure to expand the energy to change, and finally, the sharing and (mutual) learning dynamics to spread successful examples of policy implementation. The local inter-institutional governance is thereby very important for research uptake (Gasparini & Mariotti, 2023). The high relevance of the policy and implementation context is also stressed in practice-oriented empirical studies (see, e.g. UNWTO and the Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety,

2017). Said project focussed on the accelerators for ST implementation and highlighted that the most relevant catalytic factor is *not* the scientific expertise of evidence producers, but rather the context of implementation, and particularly the "interconnectedness of actors", the "communication" with affected stakeholders, the "replicability and stickiness of the core message" related to sustainability innovation and the "value structure" of leading actors and relevant stakeholders. The "expert knowledge" of academic partners is relevant in general terms but is not ranked among the seven most relevant factors.

Based on the learnings from the overall literature on knowledge utilisation, as well as the specific outcomes of existing studies on ST indicators' adoption, a knowledge gap can be identified regarding the implementation of routines and collaborative procedures to run an inter-institutional adaptive management cycle. Table 1 summarises possible approaches collected in existing literature outcomes, while the subsequent empirical section expands on them based on the example of three STOs of the INSTO UNWTO network.

Methodology

In order to deepen the understanding of existing gaps between indicator-based knowledge production on sustainability performance, the transfer of this knowledge, and its use in practice to stimulate concrete actions at destination level, an empirical study was conducted exploring the role of UNWTO INSTO observatories as innovative catalysts of transformative change. This was done by means of a multiple case study involving qualitative interviews with representatives of three different STOs as well as an analysis of relevant documents produced by each of these STOs on their aims, activities, and outputs. This methodological choice is justified on the grounds of the complex, context-dependent and contemporary nature of the subject being studied. Case studies are particularly well-suited for the purpose of this paper, as they allow for an extensive and in-depth exploration and description of the phenomena in question (Yin, 2017). In this section, the three case studies will be introduced before outlining the materials and methods applied in the research process.

Case studies description: UNWTO INSTO observatories for ST

The UNWTO's INSTO network initiative has been active since 2004 and was among the first approaches to monitor ST and to foster networking activities at a global level. At the time of

Table 1. Overview of a step-by-step approach to implement ST indicators.

Approach	Description
QUALITATIVE ASSESSMENT OF LOCAL ISSUES	Collaboratively defining needs and special features of the sustainability concept at the destination level based on stakeholders' contributions
INDICATOR SCOPING, CREATION AND FINE-TUNING	Identification of local-specific indicators based on specific monitoring needs to measure sustainability and provide fit-for-purpose information to policy makers
DATA AGGREGATION PROCEDURES	Creation of keystone indicators, composite indexes, multivariate analyses, etc.
STAKEHOLDER ENGAGEMENT FOR DATA INTERPRETATION AND POLICY MIX DEFINITION	Discussion of the sustainability performance and context-based interpretation of results with local stakeholders; co-creation and testing of possible policy interventions to improve the sustainability performance
USE OF THE INDICATORS TO SUPPORT LOCAL SUSTAINABILITY-RELATED DYNAMICS (E.G. CERTIFICATION PROCEDURES, AWARDS, PRIZES ETC.)	Assessment and evaluation of the holistic performance of multiple destinations/businesses, benchmarking of different sustainability performances under a common standard, selection of best cases.

Source: own elaboration, based on Miller & Twining-Ward, 2005 and Crabolu, 2021.

writing, 37 observatories in three world regions (Asia and the Pacific, Europe, the Americas) belong to the network.

The monitoring procedure follows the adaptive approach proposed by Miller and Twining-Ward (2005) and refers to several steps in the knowledge production, translation and uptake phases: first of all the identification of *key issues/problems;* then the *definition of monitoring tools* and methods (indicators), as well as *monitoring objectives* (benchmarks); after that the *data collection* and elaboration starts, *results* are produced and used for policy making, and a progressive (and continuous) *refinement* of the indicators is guaranteed. The whole process of adaptive sustainability management requires the active involvement of local stakeholders in each phase. The ultimate goal is "to provide a systematic, timely and regular monitoring of tourism performance and impact" and "to strengthen institutional capacities to support the formulation and implementation of ST policies, strategies, plans and management processes" (UNWTO., 2016). A framework document set up by UNWTO defines the rules and guidelines for the operation and management of the observatories, focussing on the role of sustainability culture as a unifying element at both local and global levels.

Before an INSTO observatory can be founded, relevant tourism stakeholders are engaged to co-produce a preliminary study. A research institution and a DMO or regional government are the key players that can initiate the process and potentially host the observatory. Alternatively, the observatory can be hosted by an academic entity with the active support of the DMO as a key partner. This basic partnership ensures the scientific validity of the evidence produced and the local knowledge about territorial specificities, along with the possibility to activate processes of policy design and implementation. Once having joined the INSTO network, each observatory needs to monitor at least 11 mandatory issue areas within its first three years of activity. These are: tourism seasonality, employment, destination economic benefits, governance, local satisfaction, energy management, water management, wastewater management, solid waste management, accessibility, and climate action. A second obligation is to publish an annual progress report. Within the INSTO network there is no need to focus on comparable core indicators among observatories, as local specificity is deemed to be more relevant than comparability and benchmarking. For the monitoring procedure, UNWTO recommends relying on the multiple existing international standards (e.g. the European Tourism Indicators System [ETIS], the European Environmental Agency [EEA], the Global Sustainable Tourism Council [GSTC], and others).

Despite the importance of data collection and analysis, the commitment of the INSTO members goes far beyond the strict monitoring activities: according to the operational guidelines (UNWTO., 2016), the empowerment of stakeholders, the consideration of their needs and priorities, as well as an active contribution to knowledge creation around ST monitoring at the local and global scale are core assets for each observatory. Stakeholders are supposed to gather at least once a year and should provide feedback on the interpretation of annual monitoring results and agree on an implementation plan. As for the communication standards, a public website should be created and maintained and success stories should be collected and shared, together with monitoring results (UNWTO., 2016). In this way, the STO can both develop monitoring skills and learn and benefit from successful practical actions.

Although the main deliberate goal of STOs is to strengthen the institutional capacities for policy-making purposes, there are no direct suggestions on how to shape knowledge uptake in the regional networks. Different STOs around the globe are therefore experiencing different ways of monitoring, translating, and implementing ST knowledge. This paper aims to carry out a multiple case study and cross-case comparison (Yin, 2006) to investigate how STOs perform research and translate it into action. Case studies are appropriate for getting a "holistic image of real-life events (e.g. organizational processes, group behaviour etc.)" (Yin, 2006, p. 4), and are suitable to investigate "how" questions and enable the use of a variety of data types—documents, artifacts, interviews and observations. The selection of STO cases for the multiple embedded case study design was based on two key criteria: the selection of one case study for each of the three world regions identified by UNWTO with at least one observatory (Asia and the Pacific, Europe, the

Americas) and the consideration of observatories led by both research and DMO institutions. In doing so, it was aimed to account for the diversity that exists within the INSTO network and depict the variety of approaches different observatories take with regards to the production, transfer, and utilisation of knowledge. Real-life events such as STOs' data collection procedures, data processing habits and the communication and dissemination of results were reported per each case study using qualitative interviews as a source of evidence (Yin, 2017). The triangulation of the evidence emerging from three interviews per each case study and the analysis of the yearly reports enabled a holistic understanding of the working mechanisms in each unit and a later cross-case comparison. The selected cases are summarised in Table 2.

Materials and methods

The case studies analysed in this paper rely on two main data sources. First, publicly available documents reporting on the observatories' organisation and activities were collected and analysed, including, where available, the observatories' yearly reports as well as the information provided on the UNWTO website and the websites of the respective STOs. These documents helped to get insights into the structure of the observatories, their main activities as well as some core characteristics of the *what* and *how* of their knowledge production and transfer. Second, semi-structured, qualitative interviews were conducted with representatives of each observatory, aimed at uncovering more specific features and patterns of their knowledge production, translation, and utilisation processes.

Combining document collection and analysis with qualitative interviews allowed drawing on multiple data sources, including both primary and secondary data. As Nightingale (2020) argues, such data triangulation can help to get a more comprehensive and in-depth picture of a research problem and corroborate research findings. For this paper, triangulation was used to produce analytical results for each data type (qualitative data collected through interviews and through document analysis) and to comparatively evaluate their consistency within each case study. In addition, the findings for both methods could be compared to each other to strengthen the internal validity of the case study research.

Document collection and documentary analysis

Following Bowen (2009), document collection and analysis is particularly useful for qualitative case studies as a means of triangulation. The iterative process of skimming, reading, and

Table 2. Overview of the three case studies.

	Guanajuato (Mexico)	Algarve (Portugal)	Sleman (Indonesia)
Observatory's name	The Guanajuato State Tourism Observatory (OTEG)	Algarve Sustainable Tourism Observatory (AlgSTO)	Sleman Tourism Observatory (MCSTO)
Leading institution(s)	Secretariat of Tourism of Guanajuato	Algarve Tourism Board	Gadjah Mada University
Year of accession to INSTO network	2015	2020	2017
Main aims	Use tourism to foster economic growth and inclusive development; protect cultural and environmental heritage	Build up knowledge for the tourism industry; support decision-making processes; increase long-term sustainability	Develop tourism based on local culture; increase sustainability and inhabitants' welfare
Destination Surface	30,607 km^2	4,997 km^2	575 km^2
Local population	5.8 million	0.5 million	1.1 million
Main tourism products	Heritage cities San Miguel de Allende & Guanajuato City	Coastline, beaches and sea	Nature, cultural heritage

Source: own elaboration based on: UNWTO, 2022a, 2022b, 2022c.

interpretating usually combines elements of content analysis and thematic analysis. Also in our case, first, meaningful and relevant passages of text were identified and assessed. Second, a close look was taken at the selected data to unveil themes capturing what kind of knowledge is produced within each STO and how it is produced. In doing so, deductive codes derived from the literature framework above were used that were also employed in the analysis of the qualitative interview transcripts. In two of the three cases, the main text analysed was the observatories' annual report submitted to UNWTO. In one case (Guanajuato), this report was not available, so the decision was made to focus on the many regular monitoring reports and materials available on that observatory's website instead.

Qualitative interviews and content analysis

In addition to the document analysis, nine semi-structured, qualitative interviews were conducted with representatives of the three selected STOs in the period between December 2022 and June 2023. For each observatory, three representatives were interviewed. Given the small scale of the respective stakeholder working groups (ranging between four and 15 key stakeholders) and the redundancy of the evidence produced, the number of interviews conducted is considered sufficient to reach data saturation. The first representative of each observatory was suggested to the authors by UNWTO and was either leading or co-leading the monitoring unit. Subsequently, the initial contact persons were asked to propose additional possible interview partners involved in their observatory, striving for a balance between exponents of research institutions, the public sector, and the private sector. For the third case study concerning the Sleman observatory, one of the three interviews consisted of a focus group with three different representatives of the local and regional governments as well as three representatives from the Universitas Gadjah Mada Yogyakarta—the observatory's leading institution—whose participation was crucial for the organisation of the focus group and the translation of the statements by the governmental representatives due to the language barrier. A list of all the interviewees including information on their affiliation and the sector they represent is provided in Table 3. The interviews themselves took between 17 and 58 min and were based on a guideline drafted in advance, covering the three main topics of knowledge production, knowledge transfer, and knowledge utilisation. Additional questions surrounding these core topics were aimed at the organisation of the observatory, its main goals and activities, the network it is embedded in,

Table 3. List of interview partners.

Interview partner	Case study	Affiliation	Sector	Length of interview
P 1	Guanajuato (Mexico)	Secretariat of Tourism of Guanajuato	Public (State government)	43 min
P 2	Guanajuato (Mexico)	National Autonomous University of Mexico	Research (University)	26 min
P 3	Guanajuato (Mexico)	Nature and Adventure Tourism Association of Guanajuato	Private (Tourism association)	25 min
P 4	Algarve (Portugal)	University of Algarve	Research (University)	37 min
P 5	Algarve (Portugal)	Algarve Tourism Board	Private (Regional DMO)	32 min
P 6	Algarve (Portugal)	Algarve Regional Coordination and Development Commission	Public (State administration)	28 min
P 7	Sleman (Indonesia)	Universitas Gadjah Mada Yogyakarta	Research (University)	48 min
P 8	Sleman (Indonesia)	Consultancy agency	Private (NGO)	17 min
P 9 (Focus group)	Sleman (Indonesia)	Tourism villages Pancoh and Pulesari; Sleman regency	Public (local and regional governmental representatives)	58 min

Source: own elaboration.

and ideas for improvement when it comes to the impact the observatory has in its destination.

In order to systematically reconstruct the content manifest in the interviews, a qualitative content analysis was carried out with the data analysis software MAXQDA. The deductive categories and codes used in document analysis were further enriched, based on the extensive study of the relevant literature on the topic (see Section 2). Every interview was then transcribed, analysed, and coded in a sequential and iterative way by two people, in order to guarantee the intercoder reliability (see Döring & Bortz, 2016). In some cases, additional codes were introduced inductively to better grasp unexpected phenomena emerging during the dialogue. After the within-case analyses, a qualitative cross-case comparison was carried out to better understand the structural differences between the three observatories in relation to their knowledge production, translation, and utilisation. The results of these analyses are presented in the subsequent section.

Results

In the following sub-sections, the results of the case study analysis are presented by exploring and comparing the general features of the three observatories as well as their processes in the fields of knowledge production, transfer, and utilisation. This includes the outcomes of both the documentary and the interview-based data collection. Although the three STOs share some common features—most importantly regarding their overarching goal to provide relevant information to actors in the tourism sectors to enable evidence-based decision making and improving the destinations' sustainability—a number of striking differences have emerged. These differences might relate not only to the working style of the observatories, but also to their development stage, the geographical dimension of the territory, the type and aim of key stakeholders, as well as to budgetary limits and other contextual conditions, such as the pre-existing collaborative stakeholder networks. This research is analysing mostly internal characteristics of the observatory that might influence its knowledge production and use patterns, while external contextual factors are beyond the scope of the analysis. Table 4 provides an overall summary of those differences regarding the processes of knowledge production, transfer/translation, and use/utilisation.

Governance and structure

When comparing the UNWTO observatories, differences concerning general features such as the observatory's structure, its governance style, its years of experience, and the size of the monitored area can be observed. These have implications on the processes of knowledge production and transfer. Therefore, a closer look at those features can help to understand the processes applied by each observatory.

The Guanajuato State Tourism Observatory (OTEG) has already been in existence for a long time, being active since 2011 and having entered the INSTO network in 2015. It is led by a public body, the Secretariat of Tourism of Guanajuato, and therefore strongly institutionalised. However, it is also closely related to a very diverse and broad stakeholder network made up of 15 additional organisations—five representatives of different universities, five representatives of private tourism associations and five representatives of governmental institutions—who meet frequently to discuss strategic decisions and who can give input from different perspectives. Some of the organisations are further divided into specific commissions and work together on strategic projects according to their expertise. The strong collaboration of the different organisations leads to a higher legitimisation among residents, public and private stakeholders alike, as the interviewee from the Secretariat of Tourism explained:

Table 4. Overview of the cross-case comparison.

	Knowledge production	Knowledge transfer/ translation	Knowledge use/utilisation
Guanajuato (Mexico)	*Monitoring scope:* Selective (economic and destination management issues) *Process:* Collaborative and demand-driven ("user pull")	*Target groups*: Local tourism industry and government representatives *Main formats*: Website, reports and publications, email 'bulletin', presentations, trainings	*Actors*: Local tourism industry and government representatives *Types of use*: Evidence-informed decision making (mainly for strategy, marketing and promotion purposes)
Algarve (Portugal)	*Monitoring scope:* Comprehensive (economic, social, environmental and destination management issues) *Process*: research-driven ("producer push")	*Target groups*: Local tourism industry and government representatives *Main formats*: Yearly report, seminars, and conferences	*Actors*: Not yet applicable *Types of use*: No direct implementation noticed so far
Sleman (Indonesia)	*Monitoring scope:* Selective (environmental and destination management issues) *Process*: Pragmatic and solution-oriented ("user pull")	*Target groups*: Government representatives, local communities, university students, visitors *Main formats*: Presentations, discussions, and informal conversations	*Actors*: Government representatives, local communities *Types of use*: Regulations and policies (formal and informal), peer-to-peer learning

Source: own elaboration.

> […] here in Mexico a lot of people say that the information that the governments share is not trustworthy, so it is very important for us that the information of the observatory is not just from the Secretariat of Tourism, but it is from the observatory and the observatory is made up of these 15 organizations, and this is a very good point for us, because it's the point of confidence that we have to the sector, and for me this is one of the most important things. (P 1)

The monitoring area of the OTEG is vast, consisting of 46 municipalities over 30,607 km^2 and with a local population of 5.8 million people. Because of this size, the interviewee from the tourism association (P 3) mentioned the inclusion of even more stakeholders in the observatory's technical group as a possible improvement for the future.

The Algarve Sustainable Tourism Observatory (AlgSTO), on the other hand, is structured in a very different way. Four partner institutions from different sectors manage the observatory collaboratively and combine their areas of expertise: the Algarve Tourism Board is the leading institution and benefits from a close relationship with the private tourism stakeholders in the region; the Algarve university is the main responsible authority for the monitoring activities within the observatory; the Algarve coordination and development commission—a public administration connected to the national government—has a coordinative function and manages the funding; and the national DMO *Turismo de Portugal* is the gateway to tourism stakeholders outside the Algarve. Besides the four partner institutions themselves, the observatory's stakeholder network is composed of a local working group of municipalities, regional associations, and private stakeholders, some of which are further grouped into a consulting committee. However, the collaboration with the broader stakeholder group had not been institutionalised at the time of the interviews and consists of rather infrequent meetings.

The creation of the observatory happened only recently in 2019, and it became a member of the INSTO network in the following year. The area of the Algarve of 4,997 km^2 is six times smaller than the area of Guanajuato, consists of 16 municipalities, and is inhabited by around 500,000 people, leading to both a smaller monitoring area and a smaller number of stakeholders. Interesting aspects about the observatory's organisation include its funding scheme: the AlgSTO

is financed through funds for a research project from a competitive call. Since there is no baseline funding for the STO, the activity of raising funds to ensure long-term activity is a crucial task in the observatory's activities.

The third case study analysed the Monitoring Centre for Sustainable Tourism Observatories (MCSTO) in Sleman Regency, Indonesia, which is based at the Universitas Gadjah Mada Yogyakarta (UGM), making it the only case study that is entirely based within a research institution. However, all five Indonesian observatories are led by the Sustainable Tourism Council in Jakarta that works under the Ministry of Tourism. Consequently, the central government and several NGOs that advise the Ministry of Tourism on their policy frameworks also have a certain influence on the MCSTO's work. Furthermore, those aspects lead to strong collaboration among the Indonesian STOs and the responsible universities. The local network of the MCSTO UGM is further composed of the actors in the destination: the representatives of the Sleman regency's government and the two tourism villages Pancoh and Pulesari, as well as the local stakeholders within the villages. Since the villages do not aim at a conventional tourism but rather a community-based tourism through homestays, the latter mainly consist of the local population.

The Sleman observatory started its activities in 2016 and became part of the UNWTO network in 2017. The destination surface with its 575 km^2 is considerably smaller than the surface of the other two case studies, which facilitates more personal relationships with local stakeholders. Also worth mentioning is the fact that, unlike the other two case studies, the Sleman regency has some very specific needs and challenges, such as waste management, related to structural problems of the region. Along with the general goals of the STOs, the MCSTO therefore also aims at solving those issues by contributing to the implementation of concrete actions as a further step next to the monitoring and dissemination activities.

Knowledge production

When it comes to the monitoring activities and the creation of scientific evidence within the STOs, one can distinguish between different approaches depending on the different level of stakeholder involvement. The OTEG pursues a very participatory approach in its knowledge production, given the high level of stakeholder involvement from an early stage. Before the actual work of the observatory began, the core stakeholder group was established and jointly held discussions on the most important necessities of the sector in Guanajuato led to the creation of the first indicators to be monitored. As, on the one hand, needs change over time, and, on the other, timely evidence is crucial to make informed decisions, the OTEG conducts regular meetings every few months with its core stakeholder group in order to update its indicator scheme, discuss the information gathered through the monitoring activities, and define strategies for tourism development in the region more broadly.

Most of the actual knowledge production activities, including the collection and analysis of data, the elaboration of in-depth studies on specific topics, and the general coordination of the OTEG's activities, are conducted by the observatory's core team. Since the five academic stakeholders are the observatory's research commission, they coordinate specific research projects together, sharing the results with the observatory and giving general academic advice, which makes them also an important player in the OTEG's knowledge production. Furthermore, the actors from the private sector also collect information on their guests and forward them to the core team of the OTEG for further elaboration of indicators, as the following statement from the corresponding interviewee shows:

> We are collecting the information of the tourists, mainly because we need the info for the local insurance, since we do adventure tourism and sometimes extreme activities and we need to protect the visitors. So normally we ask for information from them in the beginning, before the tour, and a lot of the questions are also helpful for the observatory. So maybe I could tell that I also produce knowledge. […] all the information is transferred to the planning team and they are processing all this information. (P 3)

Regarding the content of the information gathered through the monitoring activities, the focus lies on economic tourism development indicators, while fewer indicators are being monitored in the social and the environmental dimension. The inclusion of these dimensions of sustainability into the monitoring system was mentioned as one of the key challenges in the future by the interviewee from the Secretariat of Tourism (P 1).

In comparison to the OTEG, the AlgSTO pursues a more research driven approach within its knowledge production activities. The main responsibility lies almost entirely within the Algarve University, which initially identified possible indicators for measuring the region's tourism industry and its sustainability based on literature and desk research. Local tourism stakeholders were, however, also included in a second step by applying the Delphi method in order to identify the final list of indicators to be monitored. Also, the additional three organisations have a part in the production of knowledge: The Algarve Tourism Board is, for example, more closely connected to the local stakeholders and therefore more aware of the industry's needs, being able to give their input on possibly relevant issue areas and indicators to the university. Similarly, the interviewee from the Algarve Coordination and Development Commission (P 6) also stated they are involved in these processes through consulting activities.

Next to the conventional information gathering processes, information and outcomes produced by other research projects coordinated by the region's coordination and development commission are used to generate the indicators. For the near future, the AlgSTO plans to develop a decision support system composed of predictive statistical models in order to give its stakeholders more advanced, interactive and real-time indicators.

Linking to the theoretical discussion of Section 2, the AlgSTO can be said to display certain characteristics of evidence-based practice (EBP) theories when it comes to the way knowledge is produced. This includes, first, a rather linear production of knowledge by scientific institutions for a non-scientific audience. While the AlgSTO is embedded in a network of public and private stakeholders, which were also involved at an early stage of the identification of the indicators, their involvement in the processes of knowledge production is not (yet) as strong and institutionalised as, for example, that of the OTEG (Guanajuato). Hence, compared to the latter, the emphasis on co-creation of knowledge is less pronounced in the AlgSTO. A second typical aspect of the EBP-mode of science displayed by the AlgSTO is its very sophisticated use of methods and scientific rigour in developing the monitoring system. In fact, it covers the most comprehensive list of indicators of all three case studies, including several indicators for economic and destination management as well as social and environmental aspects.

The knowledge production activities of the third case study, the MCSTO, are also mostly based within the university, involving academics from different faculties as well as students. A baseline study was conducted in the beginning in collaboration with the partner universities of the other Indonesian STOs to define some core issue areas where improvements were seen as necessary. These include the management of transport, waste, and emissions. In a next step, the Ministry of Tourism appointed the two tourism villages Pulesari and Pancoh as the main monitoring locations and the regular monitoring activities began. In order to get a holistic image of the villages and their developments, the academic actors not only analyse secondary data, but they also conduct field work on a regular basis with a lot of informal talks and discussions with the local stakeholders. In addition, the university has additional research projects connected to observatory's goals, whose data is also being included.

Even though the official organisation of the observatory seems to be a rather research-driven and top-down mode of knowledge production, the actual approach of the MCSTO UGM is very collaborative and participatory since all three interviewees confirmed the strong informal relationships between the UGM and the local stakeholders in the villages, as the following statement of the UGM representative illustrates:

> […] beyond this official arrangement we are practicing a very informal relationship. So any time we want to add something or discuss something, my colleagues or I go to the village and sometimes we just make phone calls and we have informal meetings in the villages. Of course sometimes we have formal meetings at UGM, but in many cases having meetings in the villages is much more frequent, discussing the problems as well as possible solutions. (P 7)

The fact that the team from UGM proposed and organised the focus group interview with the village representatives for our case study further illustrates those strong personal relationships and the participatory approach of the observatory. Through regular visits and informal interviews, the specific needs of the villages are therefore strongly included in the observatory's activities, which is why the MCSTO approach can be defined as very pragmatic and solution-oriented, also resembling KPU modes of science. As in the OTEG, the knowledge is created in a collaborative fashion together with key stakeholders and intended to serve local communities. Because of this focus on the specific, context-based challenges, the MCSTO has however not (yet) covered as many dimensions in their monitoring scheme, as for example, the AlgSTO has.

Knowledge transfer/translation

The transfer process of the knowledge produced to the observatories' networks as well as the formats applied also vary significantly. The OTEG seems to make use of the most diverse set of tools and formats. The observatory's website has been identified as a main transfer format by all three interviewees and uses interactive online tools (e.g. Microsoft®) as well as a colour scheme based on a traffic light system for each indicator, allowing for a visual representation of the evidence produced. In addition, further publications and reports on specific topics are shared on the website, including monthly reports on tourism activity, visitor profiles, and practical tips and guidelines for environmentally conscious hotels and visitors.

Beyond the information accessible on the observatory's website, other formats to translate and distribute the knowledge include regular presentations to different interest groups such as students and teachers at universities, companies in the tourism industry, hotel and restaurant associations, and the municipal governments. Furthermore, a yearly summit is held to present the observatory's work to all its stakeholders. In addition, practical knowledge is transferred through specific trainings for people employed in the tourism industry (e.g. working at the reception of a hotel) to improve the quality of the service. Along with the local and regional private and public stakeholders, the other regions of Mexico as well as other South American destinations are also seen as part of the target audience, since the OTEG tries to support and encourage other destinations to create their own STO.

The AlgSTO's knowledge transfer, on the other hand, is largely based on the publicly available yearly reports that include broad information about the Algarve as a tourism destination, the AlgSTO observatory, as well as the indicators produced. Furthermore, since the main target audiences are the different tourism stakeholders of the region, some seminars and small conferences were held in different cities to inform them about the observatory and the information produced by leveraging the stakeholder network of the Algarve Tourism Board. Nonetheless, in comparison to the other two case studies, the AlgSTO's focus lies more strongly on knowledge production activities, while knowledge transfer processes are a bit less elaborated. This rather linear way of transferring knowledge produced by academic actors to a non-academic audience corresponds to a "producer push" mode of research transfer to practice in line with an EBP way of thinking. However, the absence of more elaborated knowledge transfer formats can also partly be associated with the fact that the observatory has not been active for as long as the other two case study subjects. Furthermore, all interview partners acknowledged this limitation and shared information on the observatory's planned transfer formats, as also exemplified by the following statement of the interviewee from the tourism board:

> We produce annual reports and afterwards we disseminate them. But I believe that's of course quite heavy and the information is not exactly what the stakeholders need […]. The university has been working on an online platform, which will be an important step forward in terms of dissemination. And it has an interactive possibility, so that people would choose the information, the data, the indicators that they need and they can kind of mix them up and get more detailed reports on things that they need. That will be, in my opinion, one step forward. (P 5)

The platform mentioned was further described as a decision support system consisting of a publicly accessible website with predictive statistical models, interactive tools, and more disaggregated and up-to-date indicators, serving as a more advanced and innovative dissemination format. Other planned dissemination activities include the organisation of more regular stakeholder meetings and the elaboration of personalised fact sheets for each of the 16 municipalities in order to create local-specific evidence. The interviewee from the regional DMO (P 5) further emphasised the need to establish closer relations with the observatory's stakeholders, increasing its outreach and supporting better decision-making processes.

In contrast, since the MCSTO features no publicly available website or report, the main transfer formats identified are the strong advocacy and empowerment activities conducted by the observatory through field work, physical meetings, presentations, and discussions. The MCSTO UGM works closely together with its actors in order to deal with the identified problems at the micro-level, but also for awareness raising on sustainable tourism. Those events sometimes consist of informal chats and meetings; sometimes they are held in a more organised and systematic way, involving also other actors, such as NGOs, that are invited to share their knowledge about selected topics. An additional knowledge transfer format is the direct involvement of the observatory's representatives in negotiations with governmental actors, where the scientific knowledge can be used to inform those actors and influence regulations and policies. Another innovative empowerment format is the planned but not yet implemented expansion of the monitoring scheme to ten additional villages in the area. Within the framework of a national tourism development plan supported by the central government and the World Bank, the two villages initially involved could serve as good-practice examples and their learnings could be shared with the other villages. While the interviewees from the villages (P 9) expressed they are very satisfied with this approach, the interviewee from the NGO (P 8) mentioned the challenge that local stakeholders are sometimes too dependent on the recommendations and actions of the observatory and therefore not well prepared for taking actions on their own.

Other actors of the MCSTO's target group include the university students, since increasing their sensitivity towards ST was mentioned as an important goal of the university and an indirect empowerment tool to shape a more conscious management workforce in the future. Next to the actors of the touristic production, also the actors of touristic consumption—the tourists themselves—are seen as important stakeholders by the interviewee of the UGM university:

> We try to help the community to follow the criteria indicators in terms of sustainable tourism productions. But then, as you know, we are also trying to work on sustainable consumption. It is not yet being understood as something important. But as far as my understanding goes, we should try to introduce sustainable consumption, because it is also important. (P 7)

All in all, the OTEG and the MCSTO can be said to be closer to "user pull" models, as they seem to have invested more time and energy in collaborative processes with public and private stakeholders, ultimately also facilitating the translation and use of the knowledge they (co-) produced, but—on the other hand—limiting the range of issue areas that are being covered.

Knowledge use/utilisation

Regarding the direct consequences of the observatories' work, different impact levels and different utilisation forms can be observed. Regarding the OTEG, according to the interviewee

from the Secretariat of Tourism (P 1), the knowledge produced is strongly recognised, valued, and even actively requested by the observatory's stakeholders. As the interviewee explained,

> […] each April we have the results of the visitors' profile study. If we don't have these results in April, immediately in the next month, all the people are: Hey, what happened with the study? Because we need the information. (P 1)

This reaction from the stakeholders indicates that the OTEG has been quite successful in its networking and transfer activities. Most importantly, the interviewee reports that the data are used by companies but also by the state and municipal government as a basis for their marketing and promotion strategies, e.g. to identify the most important tourism markets and segments, but also to provide appropriate training programs for those working in the tourism industry. Also, companies not directly related to tourism such as local investors or event organisers sometimes show interest in the data, since it allows them to adjust their planning activities based on the tourist numbers and segments. Furthermore, the OTEG serves as an important reference for other observatories in the area as well as for other destinations interested in creating one, as the interviewee from the research institution (P 2) explained.

The impact of the environmental and social sustainability indicators seems to be smaller and secondary, since it was initially not mentioned by the three interviewees. However, after directly addressing the topic, the interviewees also emphasised the impact the observatory's work has had on the sustainable development of the destination, being able to raise awareness of the topic among private stakeholders and influencing public policies, too. As evidence for this, several examples were mentioned, such as the preparation of guidelines for sustainable event management, the promotion of regional food chains within local tourism companies, the growing collaboration between the tourism bureau and the environmental bureau of the region, the signing of the Glasgow Declaration, the winning of the 13th UNWTO Award for Innovation in 2017, and the creation of a sustainability strategy of the region.

Less impact could be observed by the AlgSTO. Since the dissemination of the results started only recently, the use of the information produced is still not very well known. It was maintained that stakeholders recognise the work of the observatory. The interviewee from the Algarve tourism board (P 5) mentioned that some stakeholders, especially municipalities, explicitly asked for the study results. However, it is not clear whether direct actions such as new policies, strategies or measures have been designed so far on the basis of the evidence produced. Possible future improvements mentioned during the three interviews include a closer collaboration with private stakeholders as well as a closer knowledge exchange among different observatories of the INSTO network. Furthermore, the identification and local communication of international best-practice-examples could motivate local stakeholders and foster the transformative impact of the observatories. The interviewee maintained that success stories are empowering and crucial for learning about implementation schemes:

> If we have good examples of other observatories around the world that are producing knowledge and of their stakeholders using this knowledge in order to take new policies, I think this is a way that we can impact our stakeholders, showing them that in other countries, in other continents, they are doing this or that, using the same type of information we are running for you. Maybe some of them will change their minds and think, okay, we can also do something for our destination. (P 4)

Regarding the knowledge use in the Sleman regency, the advocacy of concrete solution strategies and the empowerment of local communities form an inherent part of the MCSTO UGM's strategy. That is why the practical relevance of the issues covered by this observatory as well as the chances of their knowledge being implemented are relatively high and several actions have already been taken. One example includes an agreement signed by the mayors of one region committing to ST development. Other regulations implemented in the communities are not always written policies; often they are verbal and informal agreements between

the different actors, such as the redistribution of visitors among different accommodation facilities during the low season to ensure minimum capacity use for all. The representatives of the two tourism villages and of the Sleman regency (P 9) further emphasised the important help they get from the observatory on local problems such as waste management, where the UGM members actively contributed to the construction of a waste treatment facility. Other projects mentioned by them include marketing activities for the villages and projects for local food production.

Overall, the MCSTO has a more focussed perspective (both in geographical and thematic terms) and aims at expanding the observatory's activities from data gathering to the implementation of direct action. Among the possible improvements to increase the observatory's impact mentioned by the interviewee from the observatory (P 7) is the development of a self-assessment mechanism for the villages to increase their capability to also monitor their destination on their own. Additionally, the sharing of their experience with other villages—as planned under the national tourism development plan—is seen as an important tool to increase the observatory's impact in the future.

Discussion

Based on the multiple case study results, INSTO observatories as inter-institutional entities were shown to be key players in bridging the knowledge and implementation gaps in ST at destination level. The three STOs examined produced specific information on sustainability performance based on primary or secondary data, organised a network of supporting institutions, and involved key actors in the co-production of scientific evidence at several stages and levels. Despite the thematic and procedural differences among the STOs, the contribution to knowledge creation is clearly recognisable in all examined cases and there is a good awareness of the importance of generating fit-for purpose information (Rigby, 2005) for key destination players, including public and private organisations. Another common thread is the collaborative environment between academic players and DMOs or regional tourism boards, with the former mostly sharing methodological experience in gathering and analysing data, as well as theoretical knowledge about the different aspects of sustainable development, and the latter offering their communication channels and networks for the purpose of knowledge transfer. Indeed, DMOs seem to work as knowledge brokers when it comes to interconnecting with relevant actors and accessing local stakeholder networks, as well as creating a common value and trust base (UNWTO & German Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety, 2017), especially in the case of larger territories. However, it has emerged that contacts with local tourism stakeholders can also develop directly if the monitoring area is small-scale or if fieldwork and/or concrete projects are conducted.

Despite the ability to analyse and monitor the sustainability performance at local scale, the examined STOs sometimes showed only limited awareness about knowledge transfer formats that differ from the most traditional ones (e.g. speeches, presentations, newsletters, factsheets and websites). Further, they sometimes seemed to be focussed more on data sharing than on information sharing, even though they acknowledged the importance of providing *usable* evidence. Indeed, in one case there was a wish for improved technological tools for data management, in two out of three cases there was an explicit attempt to produce personalised data reports for municipalities on a micro scale. The two needs are strictly interconnected, as the ability to produce on-demand data elaborations for small-scale territorial units goes in tandem with the use of technological platforms enabling interactive data management, extraction, and elaboration. However, experts in science communication and journalism (see e.g. Angler, 2017) might argue that the simple data transfer and the complete reporting mechanisms are not the most adequate way to engage non-academic audiences. Storytelling and some form of

entertainment to elaborate on science topics and create attractive ideas for the audience might be necessary to shape the communication discourse and raise attention. This recalls the outcomes of the study by UNWTO and the German Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (2017) referring to the "Replicability and Stickiness of the core message" as a relevant accelerator for knowledge translation and uptake. The examined STOs, therefore, need to further reflect and elaborate on ways to translate data into communication messages, possibly also relying on specific (external) expertise. In this context, DMOs and their previously mentioned role as intermediaries could become pivotal to foster knowledge transfer and strengthen innovation networks at destination level (Kofler et al., 2018).

When it comes to knowledge use, the observatories do not seem to fully exploit their potential yet. This might be due to the maximisation of resource investments for data gathering and analysis in the initial development stage. It could also be a consequence of the variety of disciplines and topics monitored at the same time and the difficulty of shaping policy actions in each of the many fields. Both the complexity of sustainability science and the early stage of monitoring activities might cause an overuse of resources for knowledge generation and later a resource scarcity for the co-design of adequate policy interventions. The recommendation of Crabolu (2021) to focus on small and simple issues at first might represent a strategy to overcome the implementation barrier, as the focussed approach adopted in the case of the Indonesian STO seemed to support the achievement of (formal and informal) implementation schemes. Thereby, and in order to overcome what seems to be a trade-off between monitoring comprehensiveness and implementation capacity, the selection of priority areas among the monitoring issues might be a crucial step. Being able to link research to action using a Mode 2 science approach also has the advantage of empowering stakeholders and improving problem-solving abilities at a network level. Indeed, the literature about wicked problems (Rittel & Webber, 1973)—i.e. complex, interconnected and sometimes contradictory issues—suggests relying on iterative processes and relational knowledge to find and test possible policy solutions (Weber & Khademian, 2008). This implies, first, that building adaptive management cycles to allow for an ongoing process of experimentation, learning, and adaptation can be a useful strategy to build expertise and transfer (explicit and implicit) knowledge. Second, it also highlights that knowledge produced at network level has the potential to be spread at institutional and individual level, generating social learning and organisational changes in the entire tourism ecosystem. Relational knowledge also has the potential to strengthen the capacity to better understand patterns of cooperation at inter-institutional level in the adaptive management cycle as well as key roles and potential strengths of each institution.

The aforementioned considerations about knowledge production, translation and use in STOs show that the KPU and EBP discourses appear to coexist in the INSTO way of working, even though the KPU discourse seems to be more adherent to the INSTO operational recommendations than the EBP, as the collaborative way of thinking and the relevance of the relational information is at the very core of INSTO's philosophy. The operational guidelines of the INSTO network propose a Mode 2 science approach and advocate for a network-based growth of sustainability knowledge, both in terms of performance assessment and of implementation capacities. This potential for collaborative learning about information transfer and use is at its early stage at STO level and not yet fully explored at the global level, as the global network of observatories tends to share best practices mostly with regards to monitoring and data communication. Thanks to a wide range of meetings, webinars, and collections of sources, an experience-based knowledge platform has been successfully created by the INSTO network on good ways and approaches to generate evidence. However, the results of this study show that this might only be a first step. Indeed, in order to foster the transformative capacity of STOs, an important next step would be to collaboratively tackle the knowledge gap in the transfer and communication of evidence. This would imply stressing the importance of providing a platform, formats, and procedures to exchange not only on monitoring procedure and indicator systems, but also on challenges and lessons

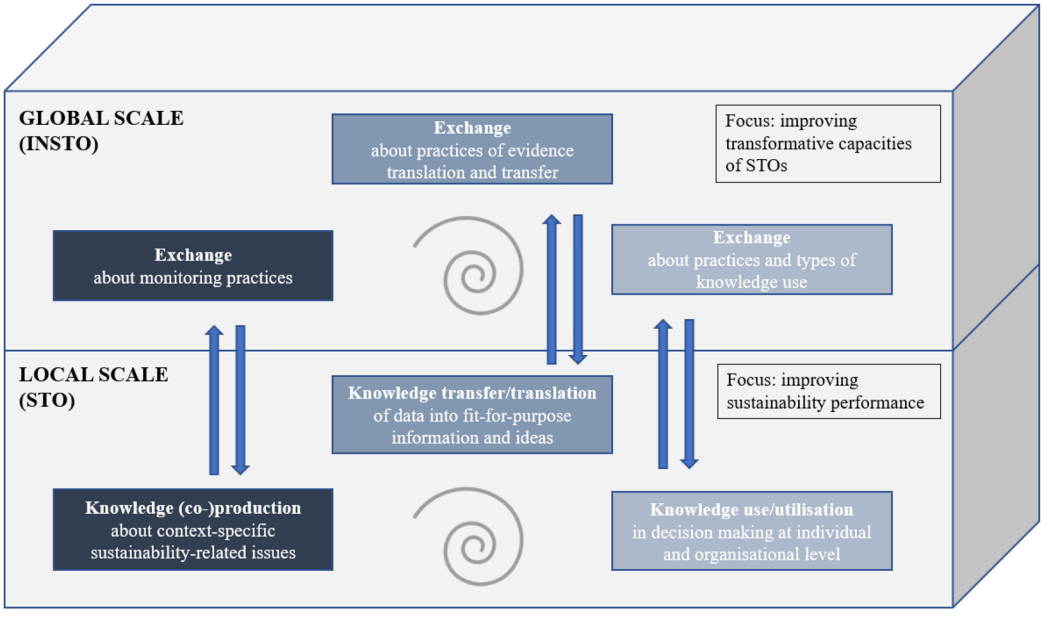

Figure 2. Research-to-action framework for INSTO observatories at local and global scale. Own elaboration.

learned with regards to the transfer and utilisation of the evidence produced. In doing so, it could become possible to capitalise on the experiences of each STO and leverage external expertise in science communication. Figure 2 illustrates how such an integrated research-to-action framework that connects both the regional and global scale could look.

At the destination level, it implies that STOs would be reliant on adaptive managed cycles aimed at collaboratively producing and translating fit-for-purpose information to be used by decision-makers. Thereby, the more traditional linear and rationalist way of conceiving processes of change implied by early versions of EBP would be replaced by more realistic assumptions that consider the contested, complex, and inherently messy nature of policymaking involving diverging and contrasting interests, values, and ideologies, as well as complex interrelations among stakeholders (Font et al., 2023). A strong involvement of the manyfold actors constituting a particular tourism ecosystem as well as their active participation—following KPU principles—in processes of monitoring, transfer, and policy design thus appears to be just as important as the quality of the monitoring process itself when it comes to improving the sustainability performance of a given destination (Scuttari et al., 2021). At the global scale, following the proposed framework, the exchange between STOs would be further strengthened, focussing also on challenges, practices, and knowledge regarding the transfer and use of the evidence produced by the STOs. In this context, the entire network could be enriched more by the knowledge sharing activity than by the standardisation of procedures. Thereby, dynamic processes of social learning could be fostered with potentially fruitful feedback on regional adaptive management cycles, which are likely to further enhance the transformative capacities of STOs and the INSTO network as a whole.

Conclusion

The aim of this paper was to explore the role of UNWTO INSTO observatories as innovative catalysts of an adaptive transformation of the tourism sector, focussing in particular on ways to overcome the widely acknowledged science-policy gap in sustainable tourism. To do so, a theoretical framework sketching two different approaches to connect research to action—EBP and

KPU—was introduced and a multiple case study conducted, which involved three selected STOs from three different world regions. The exploratory cross-case analysis showed that, despite some organisational, thematic and procedural differences, all three observatories are key players in bridging the knowledge and implementation gaps at destination level. The results also indicate that when it comes to knowledge production, translation, and utilisation, both more linear EBP and more participatory KPU approaches are reflected in the STOs' activities. While in practice the line between these two ways of linking knowledge production and utilisation are somewhat blurry, overall, it appears crucial to abandon flawed simplistic and linear conceptions of policy making and implementation processes. By doing so, the importance of collaboration with stakeholders in all three phases (knowledge production, translation, and use) is emphasised as well as the relevance of adaptive management cycles and the crucial role of intermediaries and knowledge brokers.

The paper also argues that collaborative evidence-based procedures require mutual learning processes that might range from methodological competence to network management ability. Furthermore, the relational knowledge developed by STOs as inter-institutional units and by the INSTO network as a global platform appears crucial to learn implementation by doing and to profit from an adaptive management cycle. In this iterative process, not only the transmission of evidence is crucial, but also the presence of adequate budgetary and personnel resources and the trade-offs in their use, as the implementation success depends not only on the content quality, but also on the communication and the policy context. Finally, the study shows that the potential for collaborative learning processes is not yet fully explored, either at STO level or at the level of the global INSTO network. Against this backdrop, establishing procedures and formats allowing for regular exchange between STOs on issues regarding the translation and use of knowledge might prove to be a valuable instrument to capitalise on the richness of individual experiences and thereby foster the transformative capacity of STOs more generally.

The relatively low number of three cases might be considered a limitation of the study. However, due to the explorative nature of the research, the consideration of multiple stakeholder views for each observatory, and the triangulation that was applied, this research design can be justified. Overall, the study was able to shed light on some key achievements and challenges when it comes to filling the science-policy gap in ST and to provide a useful starting point for further research. By expanding the number of cases and stakeholder views, future research might, among other things, further explore the potential typology creation of KPU- and EDP-based observatories and scrutinise the impact that different stakeholder constellations and types of involvement have on concrete transformative action at destination level.

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