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Sustainable Tourism Assessment: A Review of Indicators, Measurement Frameworks and Emerging Approaches

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Abstract:

This introductory discussion examines the major conceptual and practical challenges associated with developing indicators for sustainable tourism, drawing on contributions to the special issue to illustrate these challenges. It explores the fundamental rationale for measuring sustainability in tourism while highlighting the potential danger of allowing measurement processes to become an end in themselves rather than a means of achieving meaningful sustainability outcomes. Attention is given to the question of who should be responsible for assessing sustainable tourism and how greater inclusiveness in data generation and research processes can contribute to a more equitable distribution of knowledge and decision-making power. Another important issue concerns the geographical scale at which sustainable tourism should be assessed. Although highly localized data can provide greater contextual accuracy, broader spatial coverage is often necessary to facilitate comparison, policy formulation and stakeholder engagement. Advances in technology, data analytics and methodological approaches may provide new opportunities to overcome some of the limitations traditionally associated with tourism sustainability assessment. Finally, the discussion considers whether the development and application of sustainability indicators have translated into substantial changes in tourism policy and practice. Rather than producing direct policy transformation, indicators may contribute indirectly by improving stakeholders' understanding of sustainability, encouraging evidence-based dialogue, strengthening awareness and creating a more supportive environment for decisions aimed at promoting a sustainable tourism sector.

Keywords: *Sustainable tourism, Sustainable tourism assessment, Sustainability indicators, Tourism measurement frameworks, Sustainable tourism indicators.*

Introduction:

Scott's (1998) seminal work, *Seeing Like a State*, demonstrates how systems of planned governance depend heavily on simplifying, standardising and systematically recording information so that it can be transferred, compared and used to support administrative decisions. To illustrate this

process, Scott examines the management of European forests, showing how the systematic classification and measurement of tree species made forests increasingly legible to administrators. Once information about the composition of a forest was converted into standardized records, managers could make decisions about planting, resource allocation and productivity without necessarily having direct knowledge of the specific sites.

Although systematic data collection enhanced managerial efficiency and facilitated more productive forest management, it also contributed to significant transformations in the character and appearance of forests. The increasing emphasis on measurable productivity encouraged further interventions that simplified complex natural systems. Scott therefore highlights an important limitation of quantitative approaches: when complex ecological relationships are reduced to a limited set of measurable variables, aspects that are difficult to quantify may be overlooked. This perspective is particularly relevant to sustainable tourism assessment, where the emphasis on measurable indicators can similarly risk reducing a complex social, cultural, economic and environmental system to a set of standardized metrics.

Building on the concerns raised by Scott, European and international institutions—including Eurostat-CE, ESPON-EU, TourMIS-ECM, UNWTO and OECD have increasingly promoted the generation, standardisation and compilation of data to evaluate the sustainability performance of tourism as a complex social and economic phenomenon. However, the availability and reliability of data vary considerably across sustainability dimensions. Environmental and socio-cultural indicators often remain fragmented or comparatively weak in terms of quality and coverage (Modica et al., 2018), whereas economic indicators tend to be more comprehensive, frequently updated and readily accessible. This disparity may reflect the continuing influence of economic priorities in tourism planning and development (Bošković et al., 2020).

The development of tourism sustainability indicators has a relatively long history. An important milestone was the United Nations' *Practical Guide to the Development and Use of Indicators of Sustainable Tourism* (UN, 1996), which provided guidance for identifying and applying indicators to assess tourism sustainability. Subsequent developments demonstrate a substantial expansion in the number and diversity of frameworks, indicators and measurement systems. The UNWTO (2020) report, published almost 25 years after the earlier UN guidance, illustrates the growing institutional interest in evaluating tourism's economic, social, cultural and environmental impacts and contributions.

The continuing expansion of indicator-based approaches raises several fundamental questions concerning the purpose and practice of sustainability assessment. These include why sustainable tourism should be measured, what potential consequences may arise from an excessive reliance on indicators, who should participate in measuring tourism performance, which dimensions should be

assessed, what methodologies should be employed and what geographical or administrative scale is most appropriate. These questions are particularly important because tourism sustainability encompasses interconnected economic, environmental, social, cultural and institutional processes that cannot always be adequately represented through standardized quantitative measures.

Existing studies demonstrate considerable variation in how these issues are addressed, with researchers adopting different perspectives regarding the selection, application and interpretation of sustainability indicators. Consequently, a single universally applicable approach may not adequately capture the diverse circumstances of tourism destinations. Although international organizations such as UNWTO continue to promote greater standardisation and harmonisation of sustainable tourism measurement frameworks (UNWTO, 2020), the diversity of methodological approaches highlights the importance of maintaining critical engagement with indicator development. Rather than treating standardisation as the sole objective, future research should consider how different assessment approaches can accommodate destination-specific contexts, stakeholder priorities, data availability and the multidimensional nature of sustainability. Such a perspective can strengthen the role of indicators as tools for informed decision-making and contribute more effectively to the long-term pursuit of sustainable tourism development.

Reason to Compute Sustainable Tourism:

The primary rationale for assessing tourism sustainability is that systematically generated evidence can support more informed management of tourism destinations and the wider industry. Miller (2001) and Butler (1999) suggest that indicators can translate the relatively abstract and contested concept of sustainable tourism into more observable dimensions by identifying important drivers of change, monitoring their development over time and highlighting emerging risks (James, 2004). This function becomes particularly important as tourism operates within increasingly interconnected and complex systems. Schwab and Mallaret (2021), through the concept of "quantum politics," describe a contemporary environment in which social, economic, technological and institutional relationships have become increasingly complex and difficult to comprehend in their entirety. Within such circumstances, indicators can provide a practical means of organizing complex information and supporting decision-making.

Sustainable Tourism Indicators (STIs) perform this function by condensing, organizing and synthesizing diverse information for policymakers. Such evidence can facilitate more informed policy decisions and support the development of appropriate interventions (UN, 2007). Consequently, indicator-based assessment has become an important component of sustainable tourism planning and destination management. The growing academic literature on tourism sustainability indicators further demonstrates the increasing scholarly attention given to their development and application (Marinello et al., 2023).

However, there is another perspective on the increasing reliance on measurement. Porter (1995) argues that quantification can provide legitimacy to decisions in circumstances where public confidence in institutions and professional expertise is declining. By transforming subjective judgments into apparently objective numerical evidence, measurement can reduce the extent to which decisions are perceived as dependent upon individual authority or professional discretion. In this sense, numerical evidence can create an appearance of neutrality and strengthen confidence in decision-making processes. Porter (1995) further observes that the declining availability of time and trust in contemporary decision-making environments has encouraged greater dependence on quantitative techniques, particularly in fields where professional authority is relatively weak. When conclusions are based predominantly on expert judgment, the responsibility for defending those conclusions remains with the expert; measurement can therefore provide an alternative source of legitimacy.

This reliance on quantification, however, presents an important dilemma. When organizations increasingly manage what can be measured, issues that are difficult to quantify may receive less attention. The familiar proposition that "what gets measured gets managed" consequently raises a complementary concern: aspects that are not measured may become marginalized within decision-making processes. Excessive dependence on data can also gradually alter the role of managers and policymakers, shifting their emphasis from exercising informed judgment to administering and interpreting datasets. Porter (1995) illustrates this tension through the medical profession where practitioners initially expressed concerns that technological instruments for assessing patients might weaken the importance of professional diagnosis. Although measurement technologies are now an essential component of contemporary medical practice, the continuing discomfort associated with relying exclusively on algorithmic or artificial intelligence-based assessments demonstrates that human interpretation remains important. Delacroix (2017) similarly warns of the possibility of "moral atrophy" when individuals increasingly delegate complex judgments to technological systems, potentially weakening their capacity to respond effectively when such systems are unavailable or fail. If sustainability measurement is expected to strengthen public confidence and facilitate evidence-based policy, the credibility of the measurement process itself becomes critical. Indicators therefore need to demonstrate methodological robustness, reliability, validity and scientific credibility. This requirement partly explains the substantial growth in research devoted to developing, testing, comparing and refining sustainable tourism indicators. Nevertheless, an excessive focus on constructing increasingly sophisticated measurement frameworks can create a paradox: the technical quality of the measurement system may become more important than the sustainability outcomes that the system was originally intended to support.

A useful parallel can be drawn from Nguyen's (2021) discussion of the "gamification" of contemporary activities. Nguyen argues that digital platforms such as Twitter and fitness applications

transform complex experiences into simplified numerical indicators. Measures such as likes, reposts, heart-rate readings and calorie counts provide easily interpretable signals of performance, yet they do not necessarily capture the purpose or intrinsic value of communication, physical activity, or personal experience. Nguyen (2021) refers to the potential for "value capture," whereby complex values can gradually become simplified because institutions and technologies increasingly rely on external metrics to evaluate performance. A related concern appears in Adorno's (1969) reflection on attempts to quantify culture, where he questioned whether the very nature of culture might resist measurement. Together, these perspectives highlight the danger of allowing indicators to become substitutes for the broader values they are intended to represent.

This concern is particularly significant in sustainable tourism because tourism encompasses outcomes that extend well beyond economic performance. At the same time, the development of sustainability indicators may provide an opportunity to broaden the range of values considered in tourism planning. If tourism decision-making has historically emphasized economic returns, employment, visitor numbers and revenue generation, incorporating environmental, social, cultural and community-oriented indicators can potentially produce a more comprehensive understanding of destination performance.

Evidence from the European Tourism Indicator System (ETIS) provides an important illustration of both the potential and limitations of indicator-based approaches. Font et al. examine the relationship between sustainable tourism indicators and destination competitiveness and suggest that the limited evidence of direct policy impacts may partly reflect an overly simplistic understanding of how policy decisions are developed. Their analysis applies the concept of absorptive capacity to examine how destination management organizations acquire, interpret and incorporate knowledge generated through sustainability indicators. Drawing on interviews, document analysis and focus groups, the study indicates that destination management organizations have been able to acquire and integrate information from indicator systems. However, this knowledge has not necessarily resulted in substantial changes to established organizational practices or in the full exploitation of the information generated by the indicators.

The value of indicator systems may therefore extend beyond their capacity to produce direct policy changes. Gasparini and Mariotti, in their examination of ETIS implementation at the destination level, demonstrate that sustainability indicators can influence the broader policy environment by increasing awareness, facilitating stakeholder interaction, supporting decision justification and encouraging discussion about sustainability. Their findings suggest that although evidence of indicators directly transforming tourism policies remains limited, the process of developing and applying indicators can strengthen the relationship between sustainability evidence and policymaking. The authors also suggest that greater use of performance indicators and clearly defined targets could

strengthen the ability of destinations to determine whether they are progressing toward desired sustainability outcomes.

This finding highlights a fundamental tension in sustainable tourism assessment. On one hand, destinations require sufficient flexibility to define priorities according to their environmental, social, cultural, and economic circumstances. On the other hand, some degree of commonality in indicators and minimum expectations is necessary to facilitate comparison and establish broader standards of sustainable performance. Consequently, effective indicator systems must balance local ownership and contextual relevance with comparability and standardisation.

The benefits of indicators may also arise indirectly through organizational learning and stakeholder engagement. The process of developing sustainability indicators can encourage different groups to exchange knowledge, build collaborative relationships, increase awareness and develop a shared understanding of sustainability. These less visible effects may represent important foundations for future policy change even when indicators do not immediately produce measurable changes in policy or destination performance. In this respect, indicators can exert a "subtler influence" by creating the institutional and cognitive conditions required for subsequent sustainability interventions.

Comparable findings are reported by Torres-Delgado, López Palomeque, Elorrieta Sanz and Font Urgell in their examination of sustainable management in local tourist destinations. Their research indicates that sustainability indicators have not yet become a routine component of decision-making with conventional economic measures continuing to occupy a dominant position. Nevertheless, the increasing recognition of sustainability within tourism planning suggests that the role of broader sustainability criteria is gradually expanding. An important contribution of their work is the emphasis on designing indicators around the information requirements of policymakers rather than developing measurement systems solely for academic or technical purposes.

The authors further demonstrate that indicators can help create momentum for organizational change and encourage acceptance of alternative approaches to tourism management. However, they caution against treating indicators as the final objective of sustainability assessment. Instead, indicators should function as tools for initiating discussion, questioning existing practices, identifying areas requiring intervention and encouraging informed decision-making. From this perspective, the effectiveness of sustainable tourism indicators should not be judged exclusively by whether they generate immediate policy changes. Their contribution may also lie in improving knowledge, strengthening stakeholder dialogue, developing organizational learning and creating a more supportive environment for future sustainability-oriented decisions.

Overall, the literature suggests that sustainable tourism indicators have a dual character. They can make a complex concept more manageable, provide evidence for policymaking, strengthen accountability and broaden attention beyond conventional economic measures. At the same time,

excessive reliance on quantification can simplify complex sustainability issues, privilege what is readily measurable and potentially displace contextual knowledge and human judgment. The central challenge, therefore, is not simply to develop better indicators but to ensure that indicators remain subordinate to the broader objective of achieving meaningful and context-sensitive sustainable tourism development.

Who should Compute Sustainable Tourism?

Chalmers and Glasziou (2009) identify substantial inefficiencies throughout the research process. They conceptualize research as involving four interconnected stages: formulating appropriate questions, selecting suitable research methods, disseminating findings through accessible publication channels and ensuring that results can be reproduced. Their analysis suggests that approximately half of the research effort may be lost at each of these stages. Although their discussion is primarily concerned with biomedical research, the underlying argument is equally applicable to the social sciences. Improving the effectiveness of research therefore requires greater attention to the initial formulation of research questions. One way of achieving this is to involve the intended users and beneficiaries of research in the design of studies and where appropriate, in the processes through which evidence is generated and collected.

The importance of this principle is demonstrated by Islam, Lovelock, and Coetzee in their study of community-operated sustainability indicators at Boga Lake in Bangladesh. Their research extends the conventional understanding of community-based tourism by emphasizing not merely community participation in tourism activities, but also community involvement in defining how tourism success should be evaluated. Such participation can address a common limitation of externally funded tourism projects, in which monitoring frameworks are frequently designed around the interests and priorities of funding organizations rather than the outcomes considered important by local communities.

The Boga Lake case represents a particularly comprehensive form of community participation. Residents were involved not only in identifying and developing sustainability indicators but also in collecting the required information, managing the indicator system independently of external organizations and preparing the resulting assessment reports. Through an inclusive research process, the community developed indicators that reflected locally relevant dimensions of tourism development. An important outcome was the community's recognition that control over data and evidence could strengthen its position in negotiations with government authorities and other stakeholders. The process of collecting evidence and producing reports consequently became more than a technical exercise; it functioned as a mechanism through which the community could participate more effectively in evidence-based discussions.

This case also demonstrates that indicator development is not necessarily a politically neutral activity. Decisions concerning which aspects of tourism are measured, which data are collected, and

how findings are presented can influence whose interests become visible within policy debates. Community ownership of the measurement process can therefore provide greater agency and reduce the likelihood that externally determined indicators will be used without sufficient consideration of local priorities. The study by Islam et al. (2021) consequently illustrates how participation in sustainability measurement can contribute simultaneously to community empowerment, knowledge production and more locally meaningful tourism governance.

While Islam et al. (2021) emphasize the role of local communities, Moniche and Gallego examine the contribution of policymakers to the development of sustainable tourism indicators in Andalusia, Spain. Their study, *Benefits of Policy Actor Embeddedness for Sustainable Tourism Indicators' Design: The Case of Andalusia*, highlights the importance of incorporating governance considerations into indicator development. This perspective complements the findings of Ivars-Baidal et al. (2021), who similarly identify governance as an aspect that has received insufficient attention in many sustainable tourism indicator frameworks.

The Andalusian case provides an example of how institutional and political circumstances can create the conditions for developing a regional tourism monitoring system. The region's acquisition of greater responsibility for tourism strategy and management, combined with improvements in its capacity to generate tourism-related data and the sector's importance to the regional economy, created both the motivation and institutional capacity to establish a systematic monitoring framework. The involvement of policymakers contributed practical knowledge regarding policy processes, information requirements, and the ways in which evidence could subsequently be incorporated into decision-making.

The participation of policy actors can therefore improve the practical relevance of indicators by ensuring that measurement systems correspond to actual policy needs. Policymakers can contribute to the identification of strategically important information, assist in translating data into policy applications, and support the development of indicators specifically related to policy objectives. Nevertheless, their involvement also introduces potential limitations. Political and administrative decision-making often operates according to relatively short-term priorities, whereas sustainability outcomes may require considerably longer periods to become visible. This difference in temporal horizons can create tensions between immediate policy requirements and the longer-term objectives of sustainable tourism.

The Andalusian example also reinforces the broader debate concerning standardisation versus contextualisation. A common indicator framework can facilitate comparisons between destinations, support benchmarking, and establish minimum expectations for sustainability performance. However, applying standardized indicators across different territories may reduce attention to local circumstances and potentially weaken local ownership of the assessment process. The challenge is

therefore to develop systems that provide sufficient consistency for comparison while retaining enough flexibility to reflect local priorities, institutional capacities and destination-specific sustainability concerns.

An alternative approach to involving communities or policymakers is to rely on specialist expertise. Foronda-Robles, Galindo-Pérez-de-Azpillaga and Fernández-Tabales, in their study *Progress and Stakes in Sustainable Tourism: Indicators for Smart Coastal Destinations*, employ an expert-panel approach to develop a set of 30 indicators for assessing sustainability in smart coastal destinations. Their framework seeks to facilitate assessment across both geographical locations and different points in time. The approach draws upon the concept of Territorial Intelligence, which places particular emphasis on understanding the spatial and physical consequences of tourism activity. The framework is subsequently applied to 14 Spanish coastal destinations, providing an empirical basis for examining destination sustainability through a common set of indicators.

Expert-led approaches can provide methodological consistency and benefit from specialist knowledge, but relying exclusively on a single stakeholder category can also exclude important perspectives. Recognizing this limitation, Damian, Navarro-Jurado and Ruiz propose a more comprehensive participatory approach in their study, *Involving Stakeholders in the Evaluation of the Sustainability of a Tourist Destination: A Novel Comprehensive Approach*. Their framework seeks to involve multiple stakeholder groups not only in identifying relevant indicators but also in determining appropriate performance targets and evaluating destination outcomes against those targets.

The study emphasizes the value of multidisciplinary and participatory approaches in sustainable tourism research. Because tourism affects and is affected by multiple groups including residents, businesses, policymakers, visitors and other institutional actors assessing sustainability through a single perspective may provide an incomplete representation of destination performance. The authors therefore examine relationships among stakeholders and introduce a "power index" designed to account for differences in stakeholder influence and centrality within destination decision-making processes.

Stakeholders are invited to assess the relative importance of different indicators, after which these assessments can be combined with stakeholder-specific power scores to determine their relative influence within the overall evaluation framework. This approach makes explicit an important reality of destination governance: stakeholders do not necessarily possess equal influence over tourism-related decisions. Although incorporating a power index may reproduce some of the existing inequalities within destination governance structures, making these differences explicit can also improve transparency regarding whose preferences influence indicator selection and sustainability assessment.

Taken together, these studies demonstrate that the question of who measures sustainable

tourism is inseparable from the question of what is considered sustainable tourism. Community-based approaches can strengthen local ownership and empowerment; policymaker participation can improve the policy relevance and practical application of indicators; expert-based approaches can contribute methodological consistency and multi-stakeholder frameworks can provide a broader representation of competing interests and priorities. None of these approaches is universally sufficient. The most appropriate model is likely to depend on the purpose of the assessment, the institutional context, the characteristics of the destination and the intended users of the resulting evidence.

Consequently, the development of sustainable tourism indicators should not be regarded merely as a technical exercise involving the selection of appropriate variables. It is also a process of knowledge production, governance, negotiation and power distribution. Decisions about what should be measured, who controls the data, how indicators are weighted and who ultimately interprets the findings can substantially influence the direction of tourism policy and destination development. A more inclusive approach to indicator development may therefore enhance not only the technical relevance of sustainability assessments but also their legitimacy, ownership and potential to generate meaningful change.

Where to Compute?

The question of who should develop and undertake sustainability assessments is closely connected to another fundamental issue: at what spatial scale should sustainable tourism be measured? Sustainable Tourism Indicators (STIs) can be applied across a range of geographical levels, including international, national, regional and local scales. The choice of scale is important because tourism destinations are not isolated entities; rather, they operate within interconnected social, economic, institutional, and geographical systems. Consequently, the purpose of measurement, the selection of indicators, the suitability of measures and the availability and quality of data are all influenced by the geographical context in which tourism occurs.

The appropriate scale may also depend on the characteristics of the destination. Coastal areas, mountain regions, urban destinations, rural communities and island environments experience different forms of tourism pressure and possess distinct sustainability priorities. An indicator that is meaningful for an urban destination, for example, may have limited relevance to a rural or coastal destination. Thus, decisions regarding the spatial scale of measurement should consider not only administrative boundaries but also the environmental, economic, social and tourism characteristics of the territory being assessed.

Balas and Abson (2022) and Torres-Delgado and Saarinen (2014) demonstrate that sustainable tourism indicator systems have been developed at virtually all territorial levels, although local and regional applications appear particularly prevalent. Assessing tourism sustainability at the local level has an important advantage because tourism impacts are ultimately experienced within specific

destinations and communities (Choi & Sirakaya, 2006; James, 2004; Logar, 2010; Torres-Delgado & López Palomeque, 2014; Vera & Ivars, 2003; Vila et al., 2010). Local systems can therefore be adapted to the specific characteristics, priorities and challenges of individual destinations.

However, the flexibility associated with local assessment also creates an important methodological difficulty. Destination-specific systems can accommodate local circumstances more effectively, but differences in indicator definitions, data collection methods and assessment procedures can make comparisons between destinations difficult (Batista e Silva et al., 2018; Marinello et al., 2023). Greater contextual sensitivity may therefore come at the expense of standardisation and comparability. The emphasis on local specificity has contributed to considerable variation in the methodological design and quality of STI systems.

International initiatives have attempted to address these problems by establishing more consistent approaches to sustainability measurement. A significant development is the UNWTO's *Statistical Framework for Measuring the Sustainability of Tourism* (SF-MST), developed in cooperation with the United Nations Statistics Division (UNWTO, 2021). The framework seeks to provide a more systematic basis for measuring tourism's contributions and impacts across economic, environmental and social dimensions. Pilot applications in different countries have been used to examine the relevance and feasibility of the framework while also identifying practical challenges and context-specific solutions encountered during implementation.

Another important initiative is the UNWTO's International Network of Sustainable Tourism Observatories (INSTO). This initiative supports destinations in monitoring selected sustainability dimensions and encourages the systematic collection and use of evidence to improve tourism management. Such initiatives represent an effort to strengthen the consistency and quality of tourism sustainability data while retaining a connection to destination-level monitoring.

A contrasting approach involves developing indicators at broader regional or national levels using data generated through established official statistical systems. Regional indicator frameworks drawing on sources such as Eurostat can benefit from greater data availability, consistency, and comparability (Alfaro Navarro et al., 2020; Bertocchi et al., 2021). Nevertheless, aggregation at a higher geographical level may obscure substantial differences between individual destinations. Local variations in tourism intensity, infrastructure, community priorities, environmental pressures and stages of tourism development may become less visible when information is aggregated into regional measures. Moreover, regional policymaking institutions may have limited proximity to the local authorities responsible for day-to-day destination management. Consequently, a regional indicator system may provide an efficient means of measuring sustainability while offering limited practical value for local decision-making.

The challenge of determining the appropriate geographical boundary for sustainability

assessment therefore involves balancing several competing objectives. Data availability and statistical consistency generally improve as the scale of government and geographical aggregation increases, whereas contextual detail and destination-specific relevance tend to increase at more localized levels. At the same time, comparison across destinations requires some degree of methodological consistency. The fundamental challenge is consequently to develop assessment systems that are sufficiently specific to capture local realities while also sufficiently standardized to support comparison and broader policy learning.

One approach to reconciling these competing requirements is the use of a core-and-contextual indicator model. Under this approach, destinations use a common set of indicators to facilitate comparison while also incorporating additional indicators that reflect local circumstances and priorities (Biermann et al., 2017; European Commission, 2016; Kanie & Biermann, 2017; Lu et al., 2015; UNWTO, 2004). Such a framework can provide a degree of harmonisation without requiring every destination to be evaluated through an identical set of measures.

Implementing this approach, however, requires coordination across administrative boundaries and disciplinary areas. Tourism sustainability involves multiple policy domains including transport, environmental management, economic development, employment, infrastructure, culture and community development. Consequently, effective implementation requires collaboration among different government departments and between different levels of governance (Pan et al., 2018). Fragmented tourism policies can result in indicators that are too narrowly focused to reflect the wider context while highly general indicators may be insufficiently sensitive to local needs. This creates a continuing difficulty in designing STIs that simultaneously achieve contextual relevance and broader applicability (Torres-Delgado & Saarinen, 2014).

Bertocchi, Camatti, Salmasi, and van der Borg provide an important contribution to this debate through their study, *Assessing the Tourism Sustainability of EU Regions at the NUTS-2 Level with a Composite and Regionalised Indicator*. Their work illustrates the potential of the regional level as a compromise between the competing requirements of data availability, comparability, and geographical specificity. The authors adapt the World Economic Forum's Tourism and Travel Competitiveness Index to a regional context, enabling destinations to be compared while relying substantially on existing datasets and maintaining connections with national-level indicators.

An important consideration in their approach is the confidence that policymakers place in the evidence available to them. Indicators are more likely to be used in policy processes when they are perceived as reliable, understandable and comparable. By drawing upon established national and regional datasets, the proposed framework seeks to strengthen confidence in the resulting assessments. The authors further develop a dashboard that allows users to visualize the relative sustainability performance of European regions. Such visualization can support benchmarking and make differences

in destination performance more accessible to policymakers and other users.

The importance of comparison is also evident in research examining destinations that implemented the European Tourism Indicator System (ETIS). Gasparini and Mariotti highlight the potential value of web-based comparison between destinations, although such comparisons require some degree of commonality in indicator definitions and measurement procedures. The original ambitions of ETIS therefore illustrate the continuing tension between bottom-up contextualisation and top-down standardisation.

A more strongly destination-specific perspective is presented by Blázquez-Salom, Cladera, and Sard in their study of sustainability indicators for overtourism and undertourism in Majorca. In contrast to approaches emphasizing common regional indicators, the authors argue that certain tourism challenges are sufficiently specific to individual destinations that measurement systems need to reflect local conditions in considerable detail. Their analysis of Majorca demonstrates how indicators can contribute not merely to measuring an already defined problem but also to improving understanding of the problem itself.

This distinction is particularly important in relation to concepts such as overtourism and undertourism. These phenomena cannot necessarily be understood simply through visitor numbers. The consequences of tourism may depend on how tourism activity interacts with housing, employment, infrastructure, local perceptions, environmental conditions and community well-being. A destination-specific assessment can therefore identify dimensions that might remain invisible within standardized systems. Examples such as strikes, protests and residents' experiences of uncivil behaviour demonstrate the potential value of incorporating unconventional social indicators when these provide insight into destination-specific pressures.

The Majorca case also highlights the importance of reconsidering sustainability measurement following major disruptions such as the COVID-19 pandemic. Rebuilding tourism should not necessarily mean restoring previous tourism models without modification. If destinations seek to develop more sustainable forms of tourism, the systems used to evaluate tourism performance must also evolve. A lack of readily available data should therefore not automatically prevent destinations from attempting to measure important sustainability issues. Instead, the identification of data gaps can itself become an important component of destination sustainability planning.

The local scale is similarly central to the study by Torres-Delgado, López Palomeque, Elorrieta Sanz, and Font Urgell, which examines sustainable tourism management across destinations in the province of Barcelona. Their indicator system builds on the ETIS framework but adapts it to local conditions. The authors emphasize the local destination as a particularly important level of analysis because it is where stakeholders interact directly and where many tourism-related decisions are implemented.

Their research also demonstrates the practical constraints associated with local sustainability monitoring. Developing an effective indicator system requires data that are sufficiently available, reliable, detailed and comparable. Yet destinations frequently face limitations in financial resources, staff capacity, technical expertise and time available for data collection. The study therefore seeks to establish an indicator framework that can be applied consistently across 38 destinations within the province while allowing two forms of assessment: comparison of each destination's performance over time and benchmarking between different destinations.

This dual objective is significant because sustainability assessment does not necessarily require destinations to compete against one another. Longitudinal assessment allows a destination to evaluate whether its own performance is improving, deteriorating, or remaining stable. Cross-destination benchmarking, meanwhile can identify relative strengths and weaknesses and facilitate the exchange of good practices. An effective indicator system can therefore serve both internal performance monitoring and external comparative learning.

A further application of indicators is illustrated by Niavis, Papatheochari, Koutsossopoulou, Coccossis, and Psycharis in their study, *Considering Regional Challenges When Prioritising Tourism Policy Interventions: Evidence from a Mediterranean Community of Projects*. Here, indicators are employed to establish a baseline against which the effects of specific policy interventions can subsequently be evaluated. This represents a somewhat different application of sustainability indicators: rather than simply monitoring general destination performance, the indicators are used to determine whether particular publicly supported projects have contributed to sustainable tourism objectives.

The study also illustrates the persistent difficulty of obtaining comparable data across multiple regions. Although national-level comparisons are often preferred because national statistical systems provide relatively consistent datasets, regional analysis may be more useful for identifying specific policy needs. Even when the research design prioritised indicators for which data were expected to be widely available, complete datasets could not be obtained for all 41 coastal regions included in the analysis. Nevertheless, the available evidence enabled the researchers to identify destinations where additional policy intervention appeared most necessary and to group destinations according to shared characteristics and challenges.

Overall, the literature demonstrates that there is no universally optimal spatial scale for measuring sustainable tourism. International and national systems can provide standardisation and broad comparability; regional frameworks can offer a practical balance between data availability and contextual relevance; and local systems can capture destination-specific conditions and stakeholder priorities more effectively. Each level nevertheless involves trade-offs concerning data quality, comparability, administrative relevance, cost and local specificity.

The central challenge is therefore not to identify a single "correct" spatial scale but to establish multi-level and complementary systems of measurement. Such systems could combine internationally or nationally comparable core indicators with regional and destination-specific measures that capture local sustainability priorities. This approach would allow destinations to remain sensitive to their unique contexts while contributing to wider systems of benchmarking, policy learning and sustainability monitoring. Ultimately, the effectiveness of STIs depends not simply on where data are collected, but on whether the selected scale enables the resulting evidence to be meaningful, credible, comparable and useful for the decisions that tourism stakeholders need to make.

Data Quality, Technological Innovation and the Evaluation of Sustainable Tourism Indicators:

The usefulness of Sustainable Tourism Indicators (STIs) depends fundamentally on the availability, reliability, timeliness, and capacity for continuous updating of the underlying data. Although significant improvements have been made in the broader field of sustainability data, these advances have not been fully reflected in tourism research and destination management. Consequently, the coverage, completeness, consistency and comparability of tourism sustainability indicators remain significant concerns (Alfaro Navarro et al., 2020; Buckley, 2012; Font et al., 2021).

One of the principal constraints is the limited capacity of destinations to generate and maintain appropriate datasets. Data-production capabilities are often determined by the financial, human, and technical resources available to destination organizations. UNWTO (2020) identifies insufficient funding, limited methodological guidance and inadequate technical expertise as major barriers to effective sustainability monitoring. These limitations are particularly significant in destinations where tourism institutions have restricted resources and where collecting, processing and regularly updating sustainability information competes with other operational priorities.

Another concern relates to the relationship between data availability and the definition of sustainability priorities. Existing datasets tend to reflect problems that have already been recognized and priorities that have already been established. Consequently, the information available to decision-makers may reinforce existing ways of understanding tourism rather than encourage the identification of new or previously overlooked sustainability concerns (Font et al., 2021). This creates an important methodological risk: indicator systems may be constructed around what is readily measurable rather than around what is most important to sustainable tourism development (Alfaro Navarro et al., 2020; Mitchell, 1996; White et al., 2006).

The distinction between measuring what matters and managing what can be measured is therefore central to sustainability assessment. Without a clear understanding of the purpose for which data are being collected, indicator selection can become driven primarily by data availability. This may explain why some sustainability initiatives invest considerable resources in data collection but subsequently struggle to translate the resulting information into meaningful management outcomes

(Budeanu et al., 2016; Buckley, 2012). A related problem is the repeated application of established indicator frameworks to new destinations without sufficient adaptation to their specific circumstances (Alfaro Navarro et al., 2020). Such replication may provide methodological convenience and comparability but can weaken the contextual relevance of the resulting assessment.

Technology and New Sources of Sustainability Data:

Emerging technologies offer considerable potential for addressing some of these limitations. The development of smart destinations has increased the use of information and communication technologies (ICTs), digital platforms, sensors and other data-generation technologies for tourism monitoring and management. These technologies can facilitate the collection of information in more automated and potentially real-time forms while enabling researchers and destination managers to process datasets of substantially greater volume and variety than traditional approaches permit (Rahmadian et al., 2022).

The potential value of real-time and alternative data sources became particularly evident during the COVID-19 pandemic. For example, the UK Office for National Statistics used information relating to traffic movements and retail expenditure as early signals of changing patterns of social activity. Such data provided indications of emerging changes before conventional health statistics became available, allowing public authorities to respond more rapidly to potential disease hotspots (Diamond, personal communication, 2021). Although this example is outside tourism, it illustrates the broader potential of indirect and high-frequency datasets to support faster policy responses.

Despite these technological opportunities, evidence regarding the actual contribution of big data and artificial intelligence to destination-level sustainable tourism assessment remains limited (Balas & Abson, 2022). The use of big data introduces its own methodological and practical challenges, including questions regarding data accuracy, representativeness, accessibility, cost, privacy and completeness (Li et al., 2018). Digital sources may also fail to represent the entire population or destination. For example, online reviews reflect the experiences of individuals who choose to post reviews and therefore cannot automatically be treated as representative of all visitors or residents.

The accessibility of commercially valuable datasets presents another difficulty. Information derived from mobile-phone roaming, credit-card transactions, mobility platforms and similar sources may provide highly valuable insights into tourist behaviour, but access can be prohibitively expensive or restricted by commercial and privacy considerations (Rahmadian et al., 2022). Consequently, technological sophistication does not automatically eliminate inequalities in data availability; in some cases, it may introduce new forms of data dependency.

Artificial intelligence creates an additional skills requirement. The application of machine learning and AI techniques to sustainability datasets requires specialized knowledge in data science, statistics, and computer science. This can intensify the resource limitations already experienced by

destinations that lack sufficient technical personnel to establish and maintain indicator systems (Lisi & Esposito, 2015; Zhang et al., 2015). Thus, the adoption of advanced technologies must be accompanied by investment in institutional capacity, technical training and appropriate governance mechanisms.

Beyond Technology: Social Participation and Learning:

The expansion of technological approaches should not lead to the assumption that more sophisticated technology is always the most appropriate solution to tourism data challenges. Tourism is fundamentally a social activity, and many of its most significant impacts are experienced by people, communities, workers and visitors. Consequently, sustainability assessment should also incorporate participatory and qualitative approaches capable of capturing perceptions, experiences, values, conflicts and social relationships.

Engaging a broader range of stakeholders can enrich the knowledge base used for sustainability assessment and introduce information that may not be captured through conventional statistical systems (Baggio et al., 2010). The process of gathering information from diverse groups can also generate organizational learning, encourage dialogue, reveal conflicting perspectives and facilitate the development of shared understandings. Sustainability indicators therefore operate within complex systems in which stakeholders continuously influence both the interpretation of evidence and the outcomes of policy interventions.

This perspective connects indicator development with the concept of social learning. The process of defining, collecting, interpreting, and discussing sustainability information can itself become a mechanism through which stakeholders exchange knowledge and reconsider established assumptions about tourism development (Farsari, 2023; Twining-Ward & Butler, 2002). From this standpoint, the value of an indicator system is not restricted to the numerical information it produces. The process surrounding its development can contribute to more participatory and transparent decision-making which is increasingly associated with principles of good governance (Becken & Loehr, 2022).

Smart Destinations and Sustainable Tourism Measurement:

The relationship between technology and sustainability indicators is examined by Ivars-Baidal, Vera-Rebollo, Perles-Ribes, Femenia-Serra and Celdrán-Bernabeu in their study of sustainable tourism indicators within the smart city and destination paradigm. Smart destination approaches place considerable emphasis on data analytics, digital infrastructure and information-based management suggesting that sustainability monitoring should be an integral component of this model.

However, the authors' examination of international smart sustainability standards reveals a significant gap: tourism is frequently insufficiently represented within broader smart-city sustainability frameworks. As a result, the existence of a sophisticated smart-city system does not necessarily mean

that it provides an adequate basis for measuring tourism sustainability. Despite the conceptual compatibility between smart technologies, sustainability and data analytics, the practical contribution of smart destination initiatives to measurable sustainability outcomes remains relatively limited.

Nevertheless, the smart destination approach offers several opportunities for strengthening STI development. Ivars-Baidal et al. emphasize the importance of governance, accessibility, social inclusion, local heritage and destination identity within future smart sustainability frameworks. They also argue for reducing unnecessary complexity in indicator systems so that measures remain understandable and usable by decision-makers. In addition, technological innovation, digital information and intelligent destination-management systems could support indicators that encourage more sustainable behaviour throughout the tourism journey, incorporating both supply-side and demand-side perspectives.

The authors ultimately emphasize the need for tourism-specific sustainability indicators capable of examining the interaction between tourism activity and the broader quality of urban life. This is particularly important in smart destinations, where tourism should not be treated as an isolated sector but as one component of a wider urban, social, economic, and environmental system.

Using Technology to Measure Overtourism:

The potential of technology to improve destination-level measurement is further demonstrated by Szuster, Needham, Lesar and Chen in their study of overtourism at Kailua Beach Park in Hawai'i. Their research combines conventional visitor surveys, which capture perceptions of crowding and visitor experiences with aerial imagery obtained through drones to measure actual patterns of destination use.

This combination is important because perceived crowding and actual visitor density do not necessarily correspond. Traditional approaches to determining visitor numbers can be expensive and dependent on sampling procedures whereas drone imagery provides an opportunity to obtain relatively detailed spatial information about visitor distribution. Although manually processing such imagery remains labour-intensive, machine learning and artificial intelligence could potentially automate the identification and counting of visitors.

The resulting evidence can support decisions concerning acceptable levels of visitor use and the relationship between visitor numbers and perceived destination quality. Such information can subsequently inform management interventions, including visitor quotas, advance booking systems, pricing mechanisms, and the promotion of alternative attractions. The study therefore demonstrates how technological data collection can connect measurement directly with destination-management decisions.

From Data Collection to Sustainability Targets:

Collecting sustainability data represents only one stage of the assessment process. An equally

important issue is determining how the resulting information should be interpreted and what constitutes acceptable or desirable performance (Hunter, 1995). Indicators become more useful for decision-making when they are connected to reference conditions, targets, thresholds or desired levels of performance (Roberts & Tribe, 2008).

However, establishing such benchmarks is not a purely technical exercise. A threshold that represents acceptable sustainability in one destination may be inappropriate in another because destinations differ in their environmental characteristics, economic structures, tourism intensity, infrastructure and social priorities. The selection of a reference condition can therefore influence the assessment outcome and introduce an element of subjectivity.

Balas and Abson (2022) argue that sustainability thresholds should ideally be supported by scientific evidence, broadly accepted among relevant stakeholders, sensitive to sector-specific characteristics and realistically achievable under prevailing conditions. Crabolu and Amin (2020), however, highlight the difficulty of establishing universally applicable thresholds because destinations and assessment methodologies differ substantially. This explains why sustainable tourism research has adopted several alternative approaches to defining and interpreting performance.

Three broad approaches can be identified. The first examines whether a destination is moving towards or away from a desired sustainability condition (Roberts & Tribe, 2008). The second relies on benchmarking, comparing the performance of one destination with other territories or destinations (Bertocchi et al., 2021; Bošković et al., 2020; Cobacho-Tornel, 2019; Torres-Delgado & López Palomeque, 2014). The third combines these approaches by assessing changes in a destination over time while simultaneously examining its relative position compared with other territories (Blancas et al., 2018; Torres-Delgado et al., 2021).

Absolute quantitative limits are comparatively less common and, where they are established, they are often based on stakeholder agreement concerning the characteristics of a sustainable destination (European Commission, 2016). This reflects the difficulty of defining universal sustainability thresholds in contexts where environmental, economic, and social conditions vary considerably.

Composite Indicators versus Indicator Dashboards:

The question of how sustainability information should ultimately be presented is also important. Ciacci, Ivaldi, Mangano and Ugolini in their study *Environment, Logistics and Infrastructure: The Three Dimensions of Influence of Italian Coastal Tourism*, demonstrate an alternative approach using publicly available data and the Mazziotta-Pareto Index. Their analysis examines 301 of the 314 coastal municipalities included in the Legambiente *Guida Blu 2017* and combines multiple indicators into a composite measure of tourism performance.

The study contributes to the continuing debate between the use of composite indices and

indicator dashboards. A dashboard retains individual indicators and allows users to examine specific dimensions separately whereas a composite index condenses multiple dimensions into a single summary score. From a scientific perspective, retaining the underlying indicators may provide greater transparency and allow researchers to examine the relationships among individual variables. For policymakers, media organizations and the public, however, a single summary measure may be easier to interpret and communicate.

The central issue may therefore not be whether composite or disaggregated information is inherently superior, but whether the information is available at the appropriate time, in sufficient quality, and in a form that enables decision-makers to use it effectively. Minguela (2022) emphasizes the importance of timely, accessible, and manipulable data for policy purposes. Although a single sustainability score is attractive because of its simplicity, excessive aggregation can conceal important differences between sustainability dimensions and create an overly simplified representation of destination performance.

The implication is that the solution to measurement complexity should not necessarily be greater aggregation. Instead, destinations may require better-quality, timely, multidimensional data that allow different users to interpret sustainability according to their decision-making needs. As Minguela (2022) argues, effective sustainability assessment should provide decision-makers with reliable evidence while retaining sufficient flexibility for them to incorporate their own perspectives and priorities.

Synthesis:

The literature demonstrates that the challenge of sustainable tourism measurement extends far beyond the simple collection of additional data. Effective assessment requires attention to data quality, institutional capacity, technological accessibility, stakeholder participation, target-setting, interpretation and usability. Advanced technologies such as big data, artificial intelligence, drones, and smart-destination platforms can substantially improve the speed, scale and precision of data collection but they cannot by themselves resolve fundamental questions about what should be measured or whose definition of sustainability should guide assessment.

A robust sustainable tourism measurement system therefore needs to combine technological innovation with human judgment and stakeholder knowledge. It should be capable of generating reliable and timely evidence while remaining sensitive to destination-specific contexts and social realities. Most importantly, measurement should remain a means of supporting sustainable tourism rather than becoming an objective. The ultimate test of an STI system is consequently not the sophistication or quantity of indicators it contains, but whether the information produced helps stakeholders understand sustainability challenges, supports meaningful dialogue and contributes to better tourism decisions and outcomes.

Conclusion:

Effective sustainable tourism development requires appropriate governance structures, supportive policies, and reliable mechanisms for monitoring and evaluation (Bramwell & Lane, 2011; Pan et al., 2018). Within this broader governance framework, Sustainable Tourism Indicators (STIs) have considerable potential as adaptable instruments for assessing territorial conditions and monitoring the implementation and outcomes of tourism development strategies (Marinello et al., 2023). Over the past several decades, researchers and international organizations have proposed a wide range of indicator systems since sustainability became an established objective within tourism development (Balas & Abson, 2022; Torres-Delgado & Saarinen, 2014). Consequently, the conceptual and theoretical foundations of STIs are now relatively mature while their practical application has been demonstrated across numerous destinations.

Despite this progress, several important questions remain unresolved. One continuing challenge concerns the relationship between spatial scale, data availability, and contextual specificity. Although standardized systems can improve comparability and benchmarking highly aggregated indicators may fail to reflect local circumstances. Conversely, destination-specific systems can capture local priorities more effectively but may generate difficulties in data quality, consistency and comparison. Further empirical research is therefore needed to examine how different destinations can combine common sustainability measures with locally relevant indicators. Another significant area for future research concerns the use of emerging technologies and unconventional sources of information. Big data, artificial intelligence, mobile technologies, remote sensing, social media, digital platforms and other forms of real-time information offer considerable opportunities for strengthening sustainability monitoring. However, greater attention is required to the collection and integration of data relating to the social and environmental dimensions of tourism which have traditionally been less comprehensive than economic data. Technological innovation should not, however, become the primary objective of measurement. The fundamental question should remain why particular information is required and how it can contribute to better sustainability decisions, rather than simply incorporating variables because they are readily available.

This requires greater inclusivity in sustainability research. Indicator development should involve a broader range of perspectives, including those of residents, businesses, policymakers, visitors, community organizations and other groups affected by tourism. Such participation can challenge assumptions about whose knowledge is considered authoritative and can provide a more comprehensive understanding of destination sustainability. Future tourism governance should therefore move towards more inclusive approaches in which expertise is understood as distributed across different stakeholder groups rather than concentrated exclusively within technical or institutional authorities.

Moving Beyond the Search for a Perfect Indicator System:

Reviews of sustainable tourism research frequently conclude with extensive lists of questions requiring further investigation. However, the sustainability of research itself is increasingly recognized as an important concern within academic practice. For many years, the absence of adequate data has been cited as a major obstacle to making informed sustainability decisions. Yet three decades of research have generated a substantial body of tourism sustainability indicators, datasets, measurement frameworks, and assessment methodologies.

The evidence now suggests that the central problem is not simply a lack of indicators. Rather, there is a growing recognition that no universal or perfect indicator system is likely to exist. Tourism destinations differ substantially in their environmental conditions, economic structures, institutional capacities, tourism intensity, social characteristics and development priorities. Consequently, a single standardized set of STIs cannot adequately represent every destination. At the same time, the extensive proliferation of indicator systems has created a different challenge: the abundance of alternatives can produce complexity and "choice overload" for destinations seeking to establish their own monitoring systems.

Nevertheless, the accumulated knowledge base is now sufficiently extensive to allow destinations that are genuinely committed to sustainability assessment to develop contextually appropriate measurement systems. The objective of future research should therefore not be the elimination of methodological diversity but the development of greater coherence and guidance. A global or internationally recognized framework could provide a common foundation for sustainable tourism assessment while allowing destinations sufficient flexibility to adapt indicators according to their specific circumstances.

The European Tourism Indicator System (ETIS) provides an important precedent for such an approach. Its experience demonstrates the potential of combining common indicators with destination-level adaptation. However, the absence of sustained institutional support at the European level limited the opportunity for ETIS to become a universally established framework. The development of the UNWTO's Statistical Framework for Measuring the Sustainability of Tourism (MST) represents another important opportunity to strengthen international coordination, methodological guidance and institutional leadership in this area.

From Awareness to Policy Transformation:

An important limitation of existing indicator systems is the gap between measurement and policy action. STIs have frequently been successful in increasing awareness of sustainability concerns, improving knowledge about tourism impacts, and facilitating dialogue among stakeholders. Their influence on actual governance arrangements and the integration of sustainability into concrete tourism policies, however, appears considerably weaker (McLoughlin et al., 2018; Modica et al., 2018).

This distinction is critical because sustainable development requires more than monitoring change. It involves modifying established patterns of resource use, consumption, production, investment and development over relatively long-time horizons. These requirements can conflict directly with conventional tourism priorities centred on growth, visitor numbers, revenue, and short-term economic returns.

The limited progress achieved despite the growing availability of knowledge about tourism impacts raises an important question about the effectiveness of indicator-based approaches. Tourism activity at a global scale remains environmentally problematic and potentially unsustainable (Sharpley, 2022), while substantial disagreement remains regarding the long-term policies required to achieve greater sustainability (Miller, 2001). Achieving meaningful change may therefore require politically difficult decisions that challenge established interests and conventional development models.

Better information can nevertheless strengthen the capacity to undertake such change. Evidence-based knowledge can make it easier for stakeholders to identify problems, understand competing perspectives, challenge established practices, and collaborate across institutional boundaries (Farsari, 2023). In this sense, the value of indicators may lie partly in their capacity to create the informational conditions necessary for challenging the status quo.

However, the ultimate purpose of STIs should be to contribute to better decisions, rather than simply to produce better measurement systems. Current academic and professional work remains relatively concentrated on the construction, refinement and technical evaluation of indicators, while comparatively less attention has been directed towards understanding how these indicators affect planning and policymaking. There is still insufficient evidence demonstrating that STI implementation consistently produces more sustainable decisions at the destination level.

Future research should consequently move beyond asking whether indicators are technically valid and examine how evidence enters decision-making processes. This includes investigating how policymakers interpret sustainability information which institutional or political factors prevent evidence from being acted upon, how competing interests influence decisions and under what circumstances indicators can generate meaningful policy change. Understanding these processes is essential for determining the actual contribution of data and measurement to sustainable tourism governance.

Indicators as Decision-Support Tools, Not Decision-Makers:

Finally, sustainability indicators should not be expected to replace human judgment. Data and metrics provide important evidence, but they cannot independently determine the appropriate course of action in every destination or circumstance. Tourism destinations are dynamic and context-dependent systems, and decisions frequently involve uncertainty, competing objectives, ethical considerations, political interests and circumstances that cannot be fully represented through numerical

measures.

Experience and professional judgment therefore remain essential in interpreting what the available evidence means within a particular context. The same indicator value may have different implications depending on the destination's institutional capacity, environmental conditions, social relationships or stage of tourism development. Consequently, decision-makers need to combine empirical evidence with contextual knowledge and informed judgment.

The role of researchers and sustainability professionals should therefore extend beyond developing increasingly sophisticated measurement tools. Their responsibility is also to ensure that relevant evidence is incorporated into meaningful discussions about the future of destinations. Indicators should stimulate questioning, dialogue, evaluation and informed action rather than encourage unquestioning confidence in numerical outputs.

Ultimately, the success of sustainable tourism measurement should not be judged by the number of indicators developed, the sophistication of the analytical model or the volume of data collected. Its real value lies in whether it helps destinations understand their sustainability challenges, engage diverse stakeholders, make better-informed choices and translate knowledge into meaningful changes in tourism policy and practice.

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