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Sustainable Tourism Indicators and Sustainable Development Goals of 2030 Agenda: A Mapping

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Abstract

The 2030 Agenda by United Nations (United Nations, 2015) aims at extinguishing poverty, fighting inequality, facing climate change, and promoting human rights, local culture, and employment opportunities. Accordingly, it fosters three dimensions of sustainable development: economic, social, and environmental. The core of the 2030 Agenda is the achievement of 17 Sustainable Development Goals (SDGs) to be measured and monitored by means of specific, reliable, and valid indicators.
Tourism sustainability is a component part of the 2030 Agenda (UNWTO & UNDP, 2017). In accordance with the SDG 12.b *Develop and implement tools to monitor sustainable development impacts for sustainable tourism, which creates jobs, promotes local culture and products*, in the present paper tourism sustainability indicators are organized in the frame of the 17 SDGs.
A set of tourism sustainability indicators is identified in the literature and in specific datasets (e.g., Eurostat). Then, each indicator is related to one or more SDGs. The mapping is drawn along the social, economic, political, and environmental dimensions, according to specific sustainability issues (Rasoolimanesh et al., 2020). This could be a sound base to build composite indicators as measures of the different facets of tourism sustainability and actionable tools for the different stakeholders: decision-makers, tourists, host communities, entrepreneurs, etc. (UNWTO, 2015).

Key words: 2030 Agenda SDGs, Tourism Sustainability, Indicators.

1. Sustainable tourism: a measurement approach

Our Common future, also known as the Brundtland report, offers the first definition of sustainable development and puts *sustainability* at the centre of the international agenda as an imperative prerequisite for development (WCED, 1987). The report stresses the need of endorsing the perspectives of both present and future generations and provides the stage for Agenda 21, the outcome of the United Nations Conference on Environment and Development, held at Rio de Janeiro in 1992 (UNCED, 1992). Agenda 21 sets out the objectives of sustainable development and the actions needed to achieve it. Since then, sustainability remains at the core of the United Nations agenda, and in September 2015, a high-level plenary meeting of the General Assembly produces the United Nations 2030 Agenda for Sustainable Development (UN, 2015). Along three dimensions of sustainable development - economic, social, and environmental - Agenda 2030 states 17 Sustainable Development Goals (SDG) and 169 targets, the attainment of which must be measured and monitored by means of specific, reliable, and valid indicators.

Since the Brundtland report, the growing relevance of the sustainable development paradigm for tourism is witnessed by UNWTO's documents, *What Tourism Managers Need to Know (*UNWTO, 1997) and *Making Tourism More Sustainable: A Guide for Policy Makers* (UNEP/UNWTO, 2005), and by the several reports, issued by the Secretariat of the World Tourism Organization for the General Assembly of the United Nations on the application of UN resolutions, on policies and programs to foster sustainable tourism development (https://www.unwto.org/sustainable-development/unga).

The attention given to tourism sustainability by the United Nations and by the World Tourism Organization stems from the acknowledgment of the pivotal role that tourism development has for local, national and global development: "*Tourism is now a major sector of the world economy, especially as it refers to the international trade in services. The management of tourism affects the conditions of destinations and host communities, and more broadly, the futures of ecosystems, regions and nations. Informed decisions at all scales are needed so that tourism can be a positive contributor to sustainable development in keeping with its role as a significant source of both benefits and potential stresses*" (WTO, 2004, 7). Tourism not only affects but also depends on economic, social, and environmental conditions. Therefore, for tourism to thrive, it is necessary to preserve and ameliorate such assets defining firstly the concept of sustainable tourism as the practices of the tourism activities aimed to preserve and develop environmental, socio-cultural, and economic resources, providing benefits in all the destinations both for mass and niche tourism segments (UNEP, 2004).

As well as for the sustainability concept, sustainable tourism is a multi-faceted construct. It involves various stakeholders and can be approached according with manifold perspectives: tourism companies (supply side), visitors (demand side), host communities, and policy-makers. Achieving sustainable tourism is a continuous process with multiple tasks. More specifically, the tourism is sustainable if allows at:

- monitoring the impacts of tourism and promoting the aware use of environmental and natural resources, key elements in tourism development to maintain ecological biodiversity (*eco-tourism* as defined by The International Ecotourism Society)
- caring and preserving the socio-cultural heritage and the traditional values of host communities for inter-cultural knowledge and exchange
- providing economic benefits to all stakeholders and overall, sustaining the welfare with stable employment and income-earning opportunities, infrastructures, and social services for the host communities and so, to contribute to the growth of well-being and the decrease of the population poverty (UNWTO, 2022)
- reaching a high level of tourist satisfaction in new knowledge and visiting experiences.

Since decades, the flowering of national and supranational policies and programs to back sustainable tourism development has been matched by the quest for specific, reliable, and valid measures of performance, in order to monitor the progress toward sustainability. A cornerstone in such a process is represented by the 2004 report of the WTO (2004). A recent document draft of UNWTO (2022) proposes a unifying statistical framework for measuring tourism sustainability.[1]

As suggested by Rasoolimanesh et al. (2023), the relevant contributions dealing with sustainable tourism development, after 2016, have treated SDGs only at large, as they have considered Agenda 2030 Goals and targets only in an indirect manner.

In order to fill this gap, we propose a frame of reference to indicators of sustainable tourism within the perspective of the 17 SDGs. Our aim is to offer a tool to empirically

[1] Chapter 6 tackles the issue of sustainable tourism indicators within the perspective of the 17 SDGs but it is not yet available on the UNWTO website.

measure the tourism contribution to the achievement of each of the 17 SDGs and so, to allow policy makers to better promote sustainable tourism policies.

2. Dimensions and impacts of sustainable tourism: why indicators?

By tourism the countries can gain international credit and appreciation and can, therefore, attract foreign investment flows, on which economic development may depend on (UNWTO, 2022). To achieve a sustainable tourism development as a continuous process of impact monitoring, all relevant stakeholders and political leaders have to be informed through specific assessments by measurement tools in order to establish data-driven or issue-driven policies.

The indicators are information sets specifically able to measure relevant time changes of the relevant variables and effects of the impacts of current issues and risk factors on such variables. They allow to assess the results of policies and behaviours for tourism development and management. Furthermore, they are useful to monitor through time series information both the changes in structures, the endogenous and exogenous factors affecting tourism and the environmental, social, and economic impacts due to tourism.

According with the *Russian dolls* model of sustainability (Levett, 1998), the primary dimensions of sustainability are nested along the following scheme (Fig. 1):

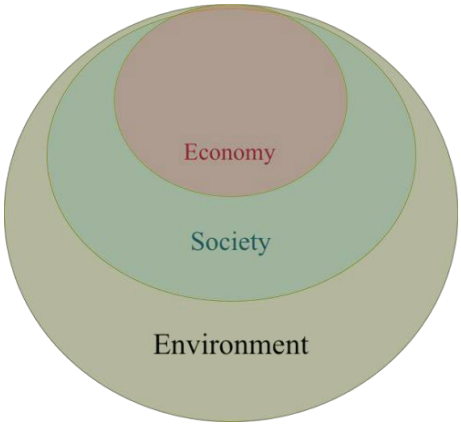

Figure 1 – *Model of sustainability* (UNWTO, 2022).

The environment is the more inclusive dimension, backing the economic and social-cultural ones: sustainability calls for a society respectful of the environment and an economic system endorsing social well-being.

Specifically, the environmental dimension often is referred to as natural capital supporting or being affected by tourism activities through ecosystem services, a stable climate, and biodiversity. As well, the environmental dimension measures the flows of natural inputs (water, energy, etc.) and residuals (GHG emissions, solid waste, food waste and plastics, wastewater and other pollutants) generated by tourism production and consumption processes. In this sense, the tourism is sustainable if preserves the quality of natural elements (air, water, sea, and landscape) in rural and urban areas, minimizing the use of non-renewable resources and the production of waste related to tourism activities.

The social-cultural dimension includes the local and traditional aspects that can support or be impacted by tourism: the protection of local cultural heritage, individual and community welfare, including health and well-being, the development of social capital of the community networks able to plan and manage tourism, and, last but not least, the fulfilment of visitors' expectations.

The economic dimension refers both to investments in produced capital of goods and services by tourism industries (and other typologies of stakeholders) and to the consumption by visitors of the food and services, too. So, tourism is sustainable if is able to ensure economic profitability for business actors, to improve the quantity and quality of employment of local population, the development of infrastructure networks and financial and non-financial income of the territory directly and indirectly related to tourism, to provide fair and equal distribution of social and economic benefits and to make sustainable the expenditure of tourists, too

Nevertheless, all the dimensions are mutually linked and overlapped. So, different issues or a same issue could be part of more than one dimension. A balance must be established between the dimensions to guarantee long-term sustainability for tourism.

In this conceptual framework, the sustainable tourism indicators are useful to assess the impact of the tourism on the above dimensions.

The environmental impact generated by tourism, like every other business, and by tourists themselves can cause negative effects in terms of landscape degradation and biodiversity loss through the damage to coastal areas, forests, coral reefs, freshwater and other ecosystems and as global effect on human-induced climate change, the carbon dioxide emissions of transportation systems. Nevertheless, as positive effects, the revenues generated from the tourism sector can be a source of benefits for the environment if employed to preserve protected areas.

On the hand of socio-cultural impact, the lack of information and awareness of the tourists about the local culture and the tourists' inappropriate behaviours can disturb way of life and social and cultural identity generating social conflicts in the local population (UNEP, 2005). This tourist-oriented perspective implies that residents' support for tourism is affected by the perceived personal benefits and the positive impacts of tourism. However, in the measure of socio-cultural impact, the residents' perspective - their perception of tourists or "the cultural distance" - is also important (Kim et. Al. 2020).

For the economic impact, both the extent of direct benefits derived from the expenditure by tourists at the destination for food, souvenirs, excursions, and tips, and the amount of money paid by tour operators to local suppliers (hotels and local transport companies) have to be measured. Indirect benefits include income from jobs and revenues for inside farmers or factories, generated by goods and services purchased by tourists. If the use of local products can increase the indirect impacts, the measurement of these effects can reveal that a destination needs fewer tourists to generate the same economic benefit for tourism enterprises, a stronger market position and less vulnerability to short-term economic changes. Moreover, the need of tourism-qualified employees will increase the level of human capital (Niedziółka, 2014). On the contrary, negative effects are generated by revenue 'leakages' of goods and services for tourists produced and purchased outside the country or area; by the diversion of funds, that could be otherwise used for providing local services, to address air and water pollution and related diseases, generated by tourist activities, and an increased cost of living for local population, due to an inflation of prices of goods and services in high-season.

Therefore, from a range of possible data sources, sustainability indicators are chosen if they are meaningful measures of tourism impact, useful to anticipate and prevent unsustainable emerging key issues related to tourism activities. In the context of sustainable development for tourism, indicators are strategic to monitor the impacts and, then, to measure the level of sustainable development, and the assets of the tourism destinations in a long-term reducing risk or costs perspective, for information-based decision making in all levels of tourism planning and management. Specifically, different levels of spatial areas are distinctive to produce sustainable tourism indicators (UNWTO, 2022):

- global, referring to all countries and marine areas

- supra-national areas, referring to sets or organizations of countries (EU, sub-continental areas, etc)
- national, country level
- regional, referring to administrative units under the national level (NUTS 1, as aggregate of NUTS 2, and NUTS 2, in the EU territorial classification scheme)
- municipal or city-region, administrative local units with relatively large populations
- locations or tourism destinations, areas within a given municipality where tourism activities and businesses are concentrated.

3. SDGs and sustainable tourism: what indicators?

The SDGs provide a comprehensive framework for promoting and developing sustainable tourism. They address a range of issues, including poverty, hunger, disease prevention, and gender equality, with a particular focus on income inequality, climate change, and biodiversity loss.

Leveraging the SDGs can be an effective way to explore the sustainability of tourism activities, as measured by a Tourism Sustainable Index (STI). This requires creating a scientifically and operationally sustainable tourism indicators' system that decision makers can adopt and implement for making management decisions. We can achieve this goal constructing a framework that considers the fundamental principles of sustainable tourism in the perspective of SDGs.

The first step is to understand the implications of each SDG for the tourism sector. Therefore, we propose to map various tourism-related indicators, identified by the relevant literature, to one or more SDS goal.

Table 1 proposes our first step toward this classification as it suggests a method, rather than exhaustive picture, that is out of the scope of the present contribution, being its future development.

Table 1 - Sustainability tourism indicators related to SGDs

SDG Goal(G) & Sust. Dim.(SD)	Sustainability issue	Indicator(s)	Data features (time and spatial (N)uts level)	Reference
G1: No poverty **SD:** Economic	Tourism demand.	-Total number of tourist arrivals/over-nigh.	Monthly data (1990.1-2023.5) N2	Blancas F. J. et al. (2015)
	Tourism revenue	-Tourism expenditure -Hotels and restaur. sector (% GDP) -IT expenditure (% GDP)	Yearly data (1975-2022) N1	
	Tourism Employement	-Employees in the service sector -Full-time employees (% service sector) -Av. length of serv. with same employer	Yearly data (2008-2023) N1 Quart. data (2008.Q1-2023.Q1) N1	
G2: Zero hungry **SD**: Econ.	Agriculture and farm	-Implementation and use of permaculture principles	Yearly data (2000-2021) N1	Schianetz. and Kavanagh 2008
G3: Good health & well-being **SD:** Social	Capacity of health services	-Hospital beds *per* inhabitant (#) -Staff employed in hospitals *per* inhabit-ant -Number of pharmacies *per* inhabitant	Yearly data (1980-2023) N1 Yearly data (1993-2022) N2	Blancas et al. (2015, 2023)
G4: Quality edu-cat. **SD:** Social	Educ. levels of residents	-% of population enrolled in non-compul-sory education	Quart. data (2008.Q1-2023.Q1) N1 Yearly data (2008-2022) N1	Blancas F. J. et al. (2015)
G 5: Gender equality **SD:** Social	Integration and reduction of gender inequal.	-% of employed women (tourism sector) -% of women employed with low-wages	Quart. data (2008.Q1-2023.Q1) N1 Yearly data (2008-2023) N1	Blancas F. J. et al. (2015)
G6: Clean water & sanitation **SD:** Environment	Water and wastewater	-Ann. water withdrawals on renew. ones -Wastewater treatment rate -% of tour. enterpr. reducing water cons.	Yearly data (1975-2020) N1	Dias J. G. (2017); Ivars-Baidal J. A.et al (2023)
	Coastal tourism	-% of coastal overnight -Trawling catch per EEZ (Tonn.per SKm)	Yearly data (2013-2022) N1	
G7: Affordable & clean energy **SD:** Environment	Energy consumption	-Use of renewable energy resources -Energy consumption of renewable resources per person and day	Yearly data (2004-2021) N1	Tanguay G. A. et al (2013);

	Energy management	-Energy intensity attribute. to tour. -Ratio of waste managed by energy recovery on waste managed	Yearly data (1990-2021) N1	Blancas F. J. et al. (2015); Ivars-Baidal J. A. et al (2023)
G8: Decent work & economic growth **SD:** Economic	Tourism employment	-Employed people (tour. sect. #) -% of employees hired full-time	Yearly data (1990-2021) N1	Blancas F. J. et al. (2015)
	Tourism seasonality	-% low-seas to peak-seas (empl. & tour.) - tourist events held in mid-low season	Monthly data (1990.1-2023.5) N1 Quart. (2008Q1-2023Q1) N1	
	Tourism quality	- % of high-quality accommodation establ. with respect to the total offer	Monthly data (1990.1-2023.5) N1 Yearly data (2012-2022) N2	
G9: Industry, innovation & infrastructure **SD:** Economic	Enterprises, innovation and Infrastr. for passenger trans.	-% of enterpr. using a voluntary certific. -innovating enterpr. supported by gover. -Density of the network (roads or railw.) -Number of public use airports	Yearly data (1970-2021) N1	Blancas F. J. et al. (2015); Ivars-Baidal J. A.et al (2023)
G10: Reduced inequality **SD:** Social	Inequality in gender, social communities, education and seasonality	-% of employed women (tour. sect.) -% of pop at-risk-of-poverty or social exclusion after social transfers -Gini coef. of equiv. dispos. income -Seasonality (nights spent per month)	Monthly data (1990.1-2023.5) N1 Quart. data (2008Q1-2023Q1) N1 Yearly data (2005-2021) N1 Month. data (1990.1-2023.5) N1	Blancas F. J. et al. (2015)
G11: Sustainable cities & communities **SD:** Social and economic	Safety, urbanization and transport	-Traffic accidents per 1000 locals -Destination safety (tourists' evaluat.) -Number of cultural assets -Urbanization and tourism - Capacity of transp. serv (air, road, rail)	Monthly data (1993.1-2023.4) N1 Yearly data (2012-2022) N2	Blancas F. J. et al. (2015) Blancas F. J. et al. (2023)
G12: Responsible cons. and prod. **SD**: Soc/Ec	Tourist offers providing a variety of exp..	-HQ offer in tourism accom. establ. -Catering and rest. services establ. -Tourist inform. offices	Monthly data (2022.7-2023.6) N1	Blancas F. J. et al. (2015)
G13: Climate action **SD:** Envir.	Atmospheric pollution	-Air pollutant emissions -Environmental protection investments	Quart. d (2010Q1-2022Q1) N1 Yearly data (1995-2022) N1	Blancas F. J. et al. (2023)
G14: Life below water **SD:** Environment	Population and water	-Air and water pollution, waste prod. -Quality of swim water -Ecological state of fresh water -Wastewater treatment plants	Yearly data (1970-2020) N1	Torres-Delgado A. and Saarinen J. (2014); Blancas. et.al. 2015)
G15: Life on land **SD:** Environment	Terrestrial ecosystems	-Degree of naturalness of a tourist area -Biodiversity conservation -% of forest cover	Yearly data (2011-2020) N1	Rasoolimanesh S. M. et al (2023); Blancas F. J. et al. (2023)
	Management of solid urban waste	-Vol. of waste collected -Vol. of waste generated per person/day -Construction density per unit area	Monthly data (1980.1-2023.6) N1 Quart. data (1980Q1-2023Q2) N1 Yearly data (2011-2020) N1	
G16: Peace & justice **SD:** Soc.	Justice system	-Personnel in the criminal justice system	Yearly data (2008-2021) N1	not in surveyed papers
G17: Partners for goals **SD**: Social	Collaboration	-Tourism flows among countries	Yearly data (1990-2021) N1	not in surveyed papers

4. Conclusions

As tourism is one of the largest and fastest growing economic sectors in the world, there is a close scrutiny of its sustainability and the natural limitations of its growth. The Sustainable Development Goals (SDGs) are the outcome of a political process and their implementation is inherently political as well (Hall et al., 2022). They have become a major focus for studying tourism's contribution to sustainable development, aligning the idea of profitability with conservation for future generations. In this work, we provide a basis for future research that aims to formulate appropriate indicators and monitoring strategies based on the SDGs. In line with UNWTO & UNDP (2017), we consider composite indicators an essential method for the sustainable management of destinations and tourist products.

Our original approach leverages a rich literature on the construction of composite indicators and their use to evaluate the progress in tourism sustainability. As preliminary analysis, we have linked measures and indicators to the 17 SDGs, discovering that not all SDGs have received the same attention in the tourism and hospitality literature analysed so far and, indeed, the number of proposed indicators linked to each SDG is very different. Furthermore, highlighting the possible relevance of drawing from the Eurostat databases, we identify some indicators for important SDGs such as Peace & Justice and Partnerships for the Goals.

We show the possibility of measuring all dimensions of sustainability (economic, social, and environmental) and, therefore, of building composite indicators that can fully inform policy makers on the progress towards the achievement of each SDG. However, our preliminary research has also highlighted a potential problem of relevance of the indicators for those contexts, such as the Italian one, where fund management and policies for the tourism industry are implemented at the regional level. In fact, there are few available measures with NUTS2 territorial detail, and their number decreases even further when timeliness becomes important (for example, when using the indicators for real-time monitoring). Nevertheless, economic digital platforms represent a promising solution, although their reliability and coherence must always be investigated to ensure the comparability over time and space of the statistical measures made available to decision-makers.

References

Blancas, F. J., Lozano-Oyola, M., González, M.: A European sustainable tourism labels proposal using a composite indicator. *Environmental Impact Assessment Review*, 54, 39-54 (2015).

Hall, C.M., Seyfi, S., Naderi Koupaei, S.: Sustainable Development Goals: Tourism Agenda 2030 Perspective article. *Tourism Review*. 10.1108/TR-10-2022-0498 (2022).

Kim, G., Duffy, L. N., & Moore, D. (2020). Tourist attractiveness: Measuring residents' perception of tourists. Journal of Sustainable Tourism, 28(6), 898-916.

Levett, R.: Sustainability indicators. Integrating quality of life and environmental protection. *Journal of the Royal Statistical Society Series A: Statistics in Society*, 161(3), 291-302 (1998).

Niedziółka, I.: Sustainable tourism development. *Regional formation and development studies* 8.3, 157-166 (2014).

Rasoolimanesh, S. M., Ramakrishna, S., Hall, C. M., Esfandiar, K., Seyfi, S.: A systematic scoping review of sustainable tourism indicators in relation to the sustainable development goals. J. Sustain. Tour., (2020) UNCED: United Nations Conference on Environment and Development (UNCED), Rio de Janeiro, (1992). Report. New York: UNCED.

UNEP/UNWTO: United Nations Environmental Program/ United Nations World Tourism Organizations. *Making Tourism More Sustainable: A Guide for Policy Makers*. France/Spain (2005).

United Nations: *Transforming our world: The 2030 agenda for Sustainable Development. Resolution adopted by the General Assembly on 25 September 2015.* United Nations A/RES/70/1 https://sustainabledevelopment.un. org/content/documents/21252030Agenda for Sustainable Development web.pdf (2015).

UNWTO: United Nations World Tourism Organizations, *What Tourism Managers Need to Know*. (1997).

UNWTO: *Tourism and the sustainable development goals*. United Nations World Tourism Organization (2015).

UNWTO: United Nations World Tourism Organizations. *Statistical Framework for Measuring the Sustainability of Tourism (SF-MST) DRAFT.* Draft prepared for the Expert Group on MST December, 2022 https://webunwto.s3.eu-west-1.amazonaws.com/s3fs-public/2023-04/SF_MST_draft.pdf, doi:10.1080/09669582.2020.1775621 (2022).

UNWTO & UNDP: *Tourism and the Sustainable Development Goals - Journey to 2030*. United Nations World Tourism Organization & United Nations Development Programme (2017).

WCED: World Commission on Environment and Development. *Our common future*. Oxford: Oxford University Press (1987).

WTO: *Indicators of Sustainable Development for Tourism Destinations A Guidebook. https://www.e-unwto.org/doi/book/10.18111/9789284407262* (2004).

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