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ORIGINAL PAPER

# Rethinking Tourism Sustainability Certification: a Circular Economy Approach - Analysis of the Circular Economy Criteria for Sustainability Certificates in Tourism

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**Abstract**
The study aims to assess international tourism certifications and identify criteria for measuring circular solutions in them, thereby examining the applicability of the circular economy toolkit in the sustainability of tourism. The research conducted a kind of bibliometric analysis to examine available certifications and possible quantification of circular economy approaches: it analysed the criteria for tourism certification based on the 9R model. Our findings show that the "Reduce" category dominates in the standards analysed, as reducing resource use is the most accessible and cost-effective solution on the path towards sustainability. However, other elements of the circular economy, such as recycling materials and products, are not yet sufficiently emphasised. Our research has quantified that the current share of circular indicators in the standards studied is only 16.95%, highlighting the need for deeper integration of circular principles. The study makes recommendations to simplify the standards, increase their transparency and develop complex certification schemes that consider sustainability and promote the circular economy in tourism.

**Keywords** Sustainability · Sustainable tourism · Sustainable standard · Circular economy · Certificate

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## Introduction

The seasonal nature of tourism and the motivation of mainly for-profit operators focused on economic profit has led to a focus on mass tourism and its negative environmental and social impacts, not on sustainability. The circular economy (CE) and the related business model have become key issues since they are a priority of the European Commission [1]. The circular economy concept defined by the Ellen MacArthur Foundation now serves as a de facto basic definition in international literature and policy: an economic system that aims to preserve the value of resources for as long as possible, minimize the generation of waste and pollution, and keep products, materials, and resources in a closed loop [2]. However, the connection is undeniable, as the circular economy model can be used to reconcile tourism with sustainable resource management; circular practices and strategic approaches (like the 'R' model) can also be applied in the tourism sector. The R-approach can be considered as a toolkit for implementing the circular economy.

All stakeholders in the sector are responsible for the positive and negative impacts of tourism, which is why there is a growing demand for guidelines and internationally recognised but locally adaptable sustainability standards. The various certifications have long been used in tourism and sustainability; eco-labels are gaining ground.

Measuring sustainability and implementing circular practices is a significant challenge for all organisations. Several institutions (e.g., International Association of Tour Operators, World Tourism Organisation, International Association of Tour Operators and European Commission) have made a significant effort to define appropriate indicators to ensure sustainable tourism development [3]. Thus, several sustainable tourism certificates (some studies estimate more than 200 worldwide) [4] target different tourism providers. Most of the indicators and standards established support strategy-making and destination-development principles.

A certificate from a credible organisation is a quality standard that helps distinguish tourism businesses that operate sustainably from other organisations. Certification can generate changes in an organisation with long-term benefits that go beyond marketing support: creating a rethought, resource-efficient business model; reducing operating costs (e.g. minimising water and electricity costs); raising industry standards to a higher level for better service quality; and raising visitor awareness of local environmental and social issues. The Global Sustainable Tourism Council (GSTC), the largest independent international sustainable tourism stakeholder group, currently recognises 31 eco-labels in tourism.

The pursuit of sustainable tourism and its quality assurance have become a global priority. A joint project between the Sri Lanka Tourism Development Authority and the United Nations Development Programme (UNDP) is contributing to the Green Destination certification of Sigiriya as a destination and 200 local micro, small and medium enterprises [5]. The Botswana Ecotourism Certification System is a quality assurance system specifically developed for campsites, based on the country's ecotourism strategy, and aims to encourage and support responsible environmental, social and cultural behaviour [6]. The certification system provides incentives for tourism businesses to adopt environmentally and culturally sensitive practices, making them more competitive both locally and internationally, and facilitating income generation, providing skilled employment opportunities, and creating a positive development experience for local residents, businesses and tourists themselves [7].

A problem and challenge, however, is that there are currently too many standards, many of which are national labels that may not be familiar to visitors to the country. The depth of the indicator sets of the standards varies greatly: some standards consist of more than 100 indicators; others look at just 20, and others only provide a certificate with training. A further practical problem is that there are few concrete standards to support and certify the sustainable operation of service providers, which organisations can use as a guide. While there is a large and extensive literature on the various Sustainable Tourism Certification (STC) schemes and their impact on different aspects of the industry, the circular economy aspects of these are not discussed and can be identified as a research gap.

Our study brings together several areas of sustainability and, within it, the circular economy in tourism: on the one hand, the measurement of sustainability through sustainability certificates (certifications that can be applied for by tourism service providers), and on the other hand, the interpretation of the circular economy in tourism (through the R's of the circular economy). Based on the literature, there is a research gap at the intersection of these two topics, which we will bridge with the study presented in this study.

This study aims to assess internationally recognised tourism certification schemes tailored to service providers and identify the criteria for circular solutions.

In the next section, we briefly describe the interpretation of the circular economy in tourism, examine what research has been done on the possibilities of measuring sustainability, and the standards for measuring sustainability. Finally, as a concretization of the topic, we present the most essential research directions on the circular economy and its measurement possibilities in tourism. This approach contributes to the definition of the research gap. After that, we describe our research methodology and the chosen standards. Then, we present the results of the analysis, the novel scientific results of the study, and compare them with previous research results.

## Literature Review

The World Travel & Tourism Council estimates that in 2024, travel and tourism will have contributed US$10.9 trillion to the global GDP, or 10% of the world economy. Globally, the industry supported 357 million jobs [8]. However, tourism also causes adverse environmental impacts. Cultural and natural heritage can also be adversely affected, mainly due to climate change caused by global warming, which has negative effects. As Lenzen et al. [9] pointed out, tourism is an energy-intensive industry whose activities cause high greenhouse gas emissions, high consumption, and pollution. According to a study examining the carbon footprint of global tourism, global tourism emissions grew by 3.5% per year between 2009 and 2019, twice the growth of the world economy, and reached 5.2 Gt CO2-e in 2019, accounting for 8.8% of total global GHG emissions [10]. On the other hand, it brings several negative impacts from an ecological point of view. The positive economic impacts are lower than the negative ones in social, environmental, and cultural terms.

### Appearance and Importance of the Circular Economy in Tourism

The circular economy and circular tourism go hand in hand with sustainable tourism practices and theories [11]. Trends are emerging on both the supply and demand sides that are

also driving the growth of the circular economy. On the supply side, the commoditisation of products and services is most prevalent in most sectors (accommodation, tour operators, online travel agencies, transport companies). There is also scope for positive arbitrage in differentiating value propositions through sustainability efforts and the circular economy model. Last, increasing regulatory pressures include climate, environment, resource use, health, and safety [12–14]. Bittner et al. [15] study in the Netherlands and Indonesia shows that tourism supply chain actors are hindered by a focus on quality service and a lack of access to information on circular practices. For Indonesian service providers, the main barriers include weak infrastructure, lack of regulation and support, and lack of education and awareness. According to Santos et al. [16] accommodation providers currently operate in a linear economic model and are in the early stages of transitioning to a circular economic model. The most adopted practices include those that result in cost savings for accommodation providers.

On the demand side, there is a search for credibility, and consumers are becoming more conscious of their travel plans. Travellers are looking for experiences and a healthier (more sustainable) lifestyle (e.g., slow travel, sports, and health tourism). A relatively recent trend is the introduction of content-driven browsing and the expectation of instant prices and availability. Increasing numbers of people are travelling alone or with several generations, linked to ageing demographics. On the other side, awareness of sustainability solutions among travellers is growing. These trends reflect the rapidly growing need for tourism operators to respond to global sustainability challenges and reduce their impacts. It also highlights the need for forward-thinking operators to position themselves as responsible and purposeful adopters of sustainable and circular business practices [17, 18].

According to Braungart et al. [19], the circular economy is a theoretical and practical model that incorporates the fundamental role of the environment, its functions, and the interaction between the environment and the different economic systems. The model aims to minimise the environmental impacts of economic activity. This requires creating and operating value-conserving, value-renewing, and recycling systems in which economic actors are given the most important role [20]. The circular economy concept is receiving increasing attention from policymakers and stakeholders worldwide [21].

Authors working on the circular economy have defined the term differently, as several conceptual approaches have considered various elements to be crucial. The study by Kaszás et al. [22] shows that most authors' research [1, 23–27] associate the circular economy with resource reduction. Subsequently, a popular approach is extending the lifespan of products/services [28], recycling, renewing natural systems, and restoring their productivity [17, 29]. In addition, authors mentioned closed-loop flows [24], economic development [30], and waste generation [25] as the most crucial points.

In a linear economic model, the pursuit of extreme economic growth exacerbates environmental degradation. However, applying circular economy principles to sustainable tourism can help the tourism sector transition from a linear to a circular economic model. Thus, the circular economy should drive social foundations without crossing any environmental ceiling while ensuring economic growth [31].

Although sustainability and circular economy are related concepts, they cannot be interpreted as synonyms. The two approaches were born with different goals and motivations [32]. While sustainability and, thus, sustainable tourism essentially take place within the framework of the linear "take-make-dispose" economic model, the circular economy (CE)

requires a systemic change in production and consumption models [33]. According to Sorin and Einarsson [17], the circular economy offers tools to create, measure and adjust sustainable models while facilitating innovation and competitiveness. In other words, sustainability is the goal, and the circular economy is the means and the driving force [32]. This is why the authors interpret the circular economy as a part of sustainability, since the circular economy and its 9R model primarily strive for resource optimization, while sustainability deals with many other areas, resource optimization being a part of it.

### Measurement of Sustainability in Tourism

Efforts to measure sustainability began in the 2010 s in tourism, and Torres-Delgado -Saarinen [34] developed indicators for sustainable tourism development. Agyeiwaah et al. [35] argued that so many indicators had been created in the past few years to measure tourism sustainability that the industry was overwhelmed by the choice, leading to inaction or the selection of the simplest solution.

Research on sustainability indicators and metrics is, therefore, widespread. Its topics include resource management (water, energy, waste), local communities, human resources, and economic sustainability.

Agyeiwaah et al. [36] analysed 27 studies using different sustainability indicator schemes and identified seven key indicator themes in sustainable tourism: job creation, business viability, quality of life, water quality, waste management, energy conservation, and maintaining community integrity. In interpreting the circular economy that is the focus of the current study, water quality, waste management, energy conservation, and community engagement can be realized through the circular economy approach.

Lee et al. [37] explored the sustainability indicators of ecological resorts through the example of Taiwan's ecological resort. The study also determined the relative weight of each sustainability indicator, emphasizing that the weight of environmental management was higher than the other dimensions. The analysis revealed 89 indicators grouped into six categories: environmental management, economic management, socio-cultural management, science and technology, human resource management, and government policy. Based on the considerations of the circular economy model, one of these indicators can be considered a strictly circular indicator (environmental management).

Bošković et al. [38] applied in practice the comparative indicators of sustainable tourism widely used in EU countries, analysing the level of tourism development achieved in mountain destinations in the Republic of Serbia. Rasoolimanesh et al. [39] examined the relationship between sustainable tourism indicators and the SDGs, while Ivars-Baidal et al. [40] examined the relationship between smart cities and destinations and sustainable tourism indicators.

Font et al. [41] also analysed the relationship between destinations and sustainability indicators, from a competitiveness perspective, based on data from the European Tourism Indicator System (ETIS). Gasparini and Mariotti [42] also examined the role of sustainable tourism indicators in political decision-making processes at the destination level, based on data from the ETIS system, in the instrumental (direct use of information for decision-making), conceptual (raising awareness) and symbolic (legitimate decisions) dimensions. These analyses primarily focused on statistical analysis of available data. They did not use a conceptual approach, so the relevance to the circular economy cannot be demonstrated based on the results.

Regarding tourism sustainability indicators, sustainability-related studies have been widely conducted in previous research based on the information and relationships that can be extracted from the ETIS system. The studies presented examined sustainability indicators concerning tourism development opportunities, the SDGs, or based on data from the ETIS system.

However, the analysis of the circular approach has not yet been presented, which can be considered a research gap. Still, the topic of further research could be the exploration of a specifically circular approach.

### Sustainability Standards in Tourism

According to Sandve et al. [43], tourism businesses are increasingly expected to operate according to the principles of sustainability, various eco-certifications have been available to the tourism industry for several decades, which can help tourism service providers adopt sustainable practices. Sustainability certification in tourism aims to promote responsible environmental, social and cultural behaviour and provide tourists with a quality product [44]. Furthermore, obtaining certification or related training can help businesses understand what they need to do to be considered sustainable and improve their performance [45]. These certificates also serve a quality function; to obtain this, the product must meet specific criteria during the certification process.

Sustainability certificates can be grouped in several ways. Sasidharan et al. [46] study, on the one hand, some certificates apply to buildings (e.g. LEED, BREEAM, EDGE), while based on geographical delimitation, four geopolitical levels can be distinguished (international – e.g. The Green Key Eco-Rating Program, regional – e.g. Nordic Swan Ecolabel, national – e.g. sLOVEnia Green and subnational – Ecotour – Spain).

In terms of tourism, certificates can also help reduce the risk inherent in customer decisions, enable the building of trust, support the brand's distinctiveness against competitors, and even help develop brand loyalty [47]. However, sustainability certifications also have many benefits for tourism businesses. According to Domingues et al. [48] and Prieto-Sandoval et al. [49], sustainability certificates visually inform consumers, provide valuable and credible information about the green properties of services, and enable consumers to choose the service that is least harmful to the environment. Nekmahmud et al. [50] study shows that awareness of green products and services is increasing among consumers.

Global sustainability certifications, such as Green Key provide a level playing field in many countries around the world regarding the existence and measurement of sustainability aspects. Green Key is the leading standard for environmental responsibility and sustainable operation in the tourism industry, with holders covering hotels, campsites, conference centres, restaurants and attractions. In 2024, for example, 76 countries had this certification [51]. National sustainability certificates (including, e.g., Nordic Swan Ecolabel) are a set of criteria covering a few countries. The Nordic Swan Ecolabel is the official environmental certification of Denmark, Finland, Iceland, Sweden, and Norway. It can be used in several industries, and in relation to tourism, there is a set of criteria for "hotels and other accommodation facilities" and "catering and conference facilities", which focus on, among other things, energy use, efficient water use, food waste prevention, efficient waste collection and employee training [52].

The idea and importance of green destination brand certification are clearly more relevant for nations heavily dependent on tourism. Destinations with prominent attractions and strong environmental associations cannot afford to neglect the sustainability dimension of their brand image [53]. The best-known certification in destination sustainability certification is the Green Destinations, which has a program with more than 600 partners and more than 160 awarded and certified destinations in about 60 countries [54].

According to Mzembe et al. [55], the literature on sustainability standards in tourism tends to focus narrowly on corporate-level motivations and retention issues and on factors or barriers to adopting sustainability certification schemes from a consumer perspective.

On the demand side, Nelson et al. [56] examined visitors' willingness to pay for green hotel-certified accommodation, which was set at a minimum of USD 1.55 and EUR 1.34 per night based on research. Similar studies have been conducted by other researchers [57–60]. Other studies have specifically analysed the intention-behavior gap phenomenon concerning sustainable accommodation choices [61]. Mzembe et al. [55] examined the design of certification systems based on the GreenKey standard to better match the perspectives and behaviour of users (tourism businesses).

A frequently recurring topic in practice is whether investing in sustainability is economically profitable for companies [62]. Similarly, the question arises concerning sustainability certificates - in addition to investments and investments during preparation - is a cost, and their periodic renewal also appears as a cost. Bilbao-Terol and Bilbao-Terol [56] examined the relationship between obtaining certificates and increased hotel prices. Still, they did not experience a significant relationship, i.e., the additional cost associated with the standards is not necessarily passed on to the consumer.

Bernader and Nicolau [63] demonstrated that environmental certification positively impacts the market value of hotels (reducing the effects of negative advertising and possible greenwashing doubts). This positive impact is higher for first-time awards than for renewed awards. Bianco et al. [64] also approached sustainability standards from an economic perspective: based on data from 251 certified Florida hotels, they demonstrated that sustainability certifications can increase key performance indicators (KPIs) such as occupancy, ADR, and RevPAR compared to competitors.

However, businesses face numerous obstacles due to the high costs associated with certification, the lack of public awareness of certifications, and the lack of government support [65].

In summary, it can be stated that a significant part of the research on sustainability standards focuses on consumers and their price acceptance and motivations. Supply-side analyses focus on the potential increase in market value associated with certificates, or rather on economic performance. It is also clear that the research has focused primarily on accommodation and, within that, on hotels. The researchers did not examine the indicator set itself, which also raises a research gap; the analysis of the composition and indicator set of certificates is an area that has not been examined so far. In particular, the identification of circular economy aspects in these standards has also been lacking in previous research.

### Indicators of Circular Economy in Tourism

According to Nocca et al. [66], tourism is organized according to a linear economic model, particularly in cities where people choose convenience over sustainability. In contrast, in

2020 Costa et al. [67] said, tourism is one of the sectors that can generate multidisciplinary benefits and, at the same time, mitigate environmental, social, and economic constraints, thus significantly and positively contributing to the implementation of the circular economy.

In 2021, Martínez-Cabrera and López-del-Pino [68] examined the challenges of the transition to a circular economy, and they identified 34 challenge patterns for the tourism sector. The 10 most significant challenges identified by the authors include, among others, the issue of resource management (inefficient waste management/recycling systems, practices and infrastructures) and the lack of willingness and trust to collaborate across the value chain. The other topics are more likely to be policy and policy making, workforce challenges, and business support. The study was based on a systematic literature review and semi-structured interviews, where 15 of the 33 interviewees were Spanish, 11 from other European countries and another 7 from outside the EU.

Nocca et al. [66] in 2023 developed an operational framework of recommendations, measures, and indicators to support authorities (and other tourism stakeholders) in identifying effective policies in the tourism sector. The Human Circular Tourism (HCT) model aims to humanize the tourism sector more effectively from a circular economy perspective by placing people at the center of the processes and considering the sector as an "interactive system". The indicators examined in the model measure the behaviour of tourists, for example, the number of tourists who declare they want to bring their bag for shopping, and the number of tourists who present a printed booking confirmation at the reception desk.

Xu et al. [69] assessed the concept of ecologization of the tourism industry from 2011 to 2019 through Chinese examples is and supplemented with the theory of the circular economy, developed an evaluation index system based on the Driver-Pressure-State-Impact-Response model (DPSIR).

In 2025, Velasco-Muñoza et al. [70] published a study in which based on systematic literature review they analysed 220 indicators to assess whether they were suitable for measuring the circularity of tourism activities. However, the authors focused on tourism subsectors and analyzed the strategies of the circular economy: (i) narrowing resource cycles, (ii) slowing resource cycles, (iii) closing resource cycles, and (iv) regenerating the environment.

From the above, many authors have dealt with interpreting the circular economy in tourism in recent years. These studies have already sought to create various composite indicators, analyse the existing set of circular indicators, or examine the human side of the circular economy. An additional research gap can be identified here. These studies have created an independent set of indicators or analysed existing ones in aggregate. Still, the indicator sets examined are not certification standards that service providers can follow to obtain certification. Thus, there is still no circular certification in tourism. Considering this, the current research specifically focuses on the sustainability ratings, measurements, and indicators that provide certification, focusing on the elements of the circular economy.

## Interpreting the "Rs" of Circular Economy

In the literature, the circular economy is often represented by the 3Rs: Reduce, Reuse, and Recycle [31, 71–77]. Ghisellini et al. [78] discussed the evolution of the circular economy concept since the 1990s in terms of the three principles. This 3Rs approach led to other "Rs", other circular measures that re/redirect energy or resources in the cycle to avoid waste.

The logic of the 4Rs (Reduce, Reuse, Recycle, Recovery) has been incorporated in many studies [26, 29] describing the circular economy model. The European Union Waste Framework Directive introduced the Recover R-element, extending the initial 3R framework [79].

Subsequently, alternative R-frame systems, such as the 6R [80], and even more extensive models, such as the 9R [81, 82], have been developed. Costa et al. [79] have extended the most used 9R (Refuse, Rethink, Reduce, Reuse/Repurpose, Repair/Refurbish, Relocate, Replace, Recycle, Regenerate/Restore/Recover) themes by introducing the R-principles Redesign, Remine, Return and Reeducate, so in fact the model he uses can be considered as a 13R.

In our study, we use the best-known of the above models (also used by Potting et al. (2017) [82] and Kirchherr - Santen (2019) [83], among others), 9R, with the definitions of the principles presented below. We aimed to choose an 'intermediate' framework that is sufficiently detailed and whose points can be reflected in sustainability standards applied in tourism and within tourism Table 1.

Circular recovery means using the revenue from operations to transform products into new products by adding value or reducing costs or waste. Circular utilisation refers to both management's continuous monitoring of assets and efforts to preserve their value, and the use of product-service models to provide leasing and sharing services, life extension, tracking of secondary raw materials, marketing, and trade facilitation services [22].

## Methodology - Assessment of Sustainability Certificates

In our study, we aimed to identify circular economy practices among the best-known tourism certification schemes. In the previous chapters, we have defined the concepts of circular economy and sustainability and described the principles and manifestations of the circular economy identified as the 9Rs.

The following goals guided us during our research:

a) identify schemes in tourism certification that focus on the circular economy approach within/beyond sustainability;
b) quantify the proportion of circular aspects in the certification criteria;
c) assess the extent to which each of the principles within the 9 Rs of the circular economy is reflected in the certificates under consideration.

For the above, we used a kind of bibliometric analysis, within the framework of which we (a) identified the tourism standards available in the scientific literature, using the Scopus and Web of Science interfaces. After that, we (b) excluded several standards from further investigation based on predefined criteria (be international, provide certification, have a criteria system for service providers, and have an accessible criteria system). After that, the (c) qualitative analysis of the criteria of the standards began, for which the method of document and content analysis was chosen. Finally, (d) the criteria indicated in the standards were classified into the appropriate CE toolkit (R). The following subsection reports on the details of the individual steps of the investigation.

**Table 1** Interpretation and use of "R's" in tourism

| "*R*" | Keywords | Source | Examples in the standards |
|---|---|---|---|
| Refuse | ¬ avoiding environmentally harmful, hazardous substances<br>¬ reducing the number of products purchased<br>¬ rejection of packaging, bags, containers<br>¬ rejection of manufacturing processes that generate waste | [31, 84–89] | no single-use equipment and packaging materials, no fossil fuels |
| Rethink/Redesign | ¬ "eco-efficient" products<br>¬ dematerialisation of material flow systems<br>¬ rethinking systems in a sustainable way<br>¬ "cradle to cradle" planning<br>¬ a focus on longevity in design and manufacturing | [25, 77, 79, 90–92] | sustainable package deals, sustainable design and renovation of buildings, service-based textile shopping |
| Reduce | ¬ minimise the use of non-renewable raw materials<br>¬ use of recyclable raw materials<br>¬ reduce the use of resources per product manufactured<br>¬ replacing toxic substances with less hazardous alternatives | [77, 78, 93–95] | water-saving taps, automatic lighting and heating, maximum business travel per person |
| Reuse/Repurpose | ¬ reuse of the product for its original purpose, without repair or refurbishment<br>¬ reuse of obsolete parts, components for new purposes or functions<br>¬ preventing materials from going to landfills | [31, 67, 96–99] | reuse of liquid food and drink packaging, rainwater harvesting |
| Repair/Refurbish | ¬ making a bad or obsolete product work again<br>¬ replacement of a faulty part<br>¬ increase product lifetime<br>¬ updating products, substances or their ingredients | [85, 89, 90, 96, 100, 101] | renovation and application of used furniture and textiles, occasional maintenance of vehicles and electronic equipment |
| Relocate | ¬ change of location of production or service<br>¬ elimination, reduction of energy consuming and waste generating transport process<br>¬ use of short supply chains | [77, 96] | recommending local products and services, promoting public transport, teaching sustainable driving |
| Replace | ¬ producing products with better resource and energy efficiency<br>¬ redesign to reduce energy and water demand<br>¬ replacement of equipment using non-renewable energy | [77, 102] | purchasing fuel-efficient vehicles, sustainable procurement, increasing the share of renewable energy sources |
| Recycle | ¬ waste disposal, processing | [31, 74, 97] | grey water recycling, composting, use of recycled paper |
| Recover | ¬ recovery of materials after the deposition phase<br>¬ creating energy or other new resources from the incineration of waste | [77, 96] | heat pump application |

## Description of the Certificates Analysed

In our study, we primarily considered the standards available in Europe that are relevant to service providers. This is because the literature widely suggests that Europe is playing a leading role in the transition to a circular economy model, especially regarding its regulatory framework [103, 104].

The first step in the research was identifying the certificates for which tourism operators can apply. To ensure a scientific basis, we used online databases such as Scopus and Web of Science. We chose the Scopus database because it is one of the largest databases of scientific journals; the Web of Science database is also used as a supplement. The keywords 'sustainability measurement,' 'sustainability indicators,' 'sustainable tourism measurement', and 'sustainable tourism indicators' were used as filters in the electronic databases. As a result of our research, we reviewed more than 150 certificates in May-August 2024 that are credible certification tools to support tourism businesses and organisations on their journey toward sustainability. These included general sustainability certificates for companies and certificates designed explicitly for tourism businesses. Of the 150 certificates, those that were selected for in-depth analysis were selected based on the following criteria:

- International certification—since the aim of our research is to make international comparisons and to identify and trace the circular pattern in sustainability certification, we have excluded those certificates that serve the national certification of a country (e.g., Green Tourism, Indicator System of Sustainable Tourism for Spanish Coastal Destinations). This way, we present the most widespread and applied certificates internationally.
- It gives a certificate—of course; self-assessment has its place and makes sense in terms of sustainability, but since marketing is one of the biggest attractions of obtaining a certificate, we have excluded certificates that do not give a certificate of achievement (e.g. BioHotels, Tripadvisor GreenLeader Award). We have also excluded online measurement and self-assessment labels on various websites that provide results for a fee.
- It is for service providers—many sustainability initiatives aim to support tourism planning (national, destination level) and to provide guidance on what to keep in mind (e.g., Statistical Framework for Measuring the Sustainability of Tourism (SF-MST), Sustainable Development Indicators for Tourism, Sustainable Tourism Development Index). In this research, we took a practical approach and analysed the certification schemes available to service providers and thus analysed the certificates that change their work along exact, measurable indicators and make it more sustainable. In doing so, we focus on the businesses that operate and the certifications that can be awarded to tourism service providers.
- Open criteria—as the analysis aims to explore the schema of the requirements for certificates, we have excluded those whose criteria are not openly available or only available after registration (e.g. Biosphere Tourism, Carbon Neutral Certification, and GreenStep).

Finally, based on the above, the criteria for 13 certificates were analysed according to the 9Rs interpretation presented in the literature. All three authors have reviewed the criteria in the certificates and have carried out a classification according to the categories of the circu-

lar economy. In cases where the authors' opinions differed, the results were discussed, and the resulting consensus position is presented in the paper Table 2.

Although our analysis focused primarily on standards available to European service providers, most of the standards selected and examined (especially those based on the GSTC system) are also available to service providers operating in Asia, Africa, Australia and South America.

**Table 2** The examined certificates

| Certificate | certification body | Type | cost (EUR, excluding audit costs) | time span (years) |
|---|---|---|---|---|
| EarthCheck | EarthCheck Advisory Group (Australia) | FP | 4100 | 1 |
| EU Ecolabel | European Commission (Belgium) | Gov | 200–2000 (depending on size) | 1 |
| EuropeSpa | European Spas Association (Belgium) | NP | n.a. | 3 |
| Global Sustainable Tourism Council | Global Sustainable Tourism Council (United States) | NP | NOT certify directly | NOT certify directly |
| Green Destination | Green Destinations Foundation (Netherlands) | NP | 2300 | 2 |
| Green Globe | Green Certifications Inc. (United States) | FP | 715–4950 (depending on size) | 1 |
| Green Key | Foundation for Environmental Education (Denmark) | NP | 500–1050 (depending on type) | 1 |
| GreenSign | GreenSign Institute GmbH (Germany) | FP | 990–2100 (depending on size) | 1 |
| ISO 9001: Quality Management Systems | International Organization for Standardization (Switzerland) | NP | depends on several factors | 3 |
| Nordic Swan | Nordic Council of Ministers (Denmark, Iceland, Finland, Norway, Sweden) | Gov | 3114 | 1 |
| QualityCoast | Coastal & Marine Union (Spain) | NP | n.a. | n.a. |
| TourCert | TourCert (Germany) | FP | 250–450 (depending on size) | 1 |
| Travelife | ABTA - The Travel Association (Netherlands) | FP | 940–2485 (depending on size) | 2 |

**NP* non-profit, *FP* for profit, *Gov* government

## Evaluation of Certificates

In total, 13 standards were examined, covering 1622 criteria (some criteria contain 20–40 elements, others more than 200, with an average of 147). Our analysis shows that on average, 17% of these criteria can be classified as R elements of a circular economy, meaning a total of 275 criteria for the 13 standards examined Fig.1.

The aggregated results also show that Reduce is by far the most dominant circular category in the standards, referring to the reduction of resource use in operational cases where there is no way to replace the resource. However, in our view, although Reducing is a key element of sustainability, it does not yet meet the criteria of a circular economy but is only a precursor. Redesign (Rethink) is the second most common element in the standards. This involves modifying the product or service, for example, using sustainable and durable materials. In tourism, it is easy to catch out, and consequently, it is also frequently included in the standards, the development of short supply chains, the elimination of transport where possible, and sustainable, environmentally friendly modes of transport. Twenty-two criteria have been identified that are about the specific substitution of resources and materials, supporting their replacement by more sustainable ones. This criterion is similar to Reduce, but it is really about substitution, which is a basic element of the circular economy. Recycling is the basis of environmental awareness, and the standards include several references to the transformation and processing of waste. It is important to note here that collecting waste separately is not recycling in itself, since it is not the tourism service provider producing new material from the waste. Likewise, in the case of Reuse/Repurpose, a component or product is reused without being transformed. In 16 cases, Repair/Refurbish was found in the standards, mainly in the preservation and ongoing maintenance of tools, machinery and equipment. The Refuse category, which refers to the reduction of the quantity purchased or

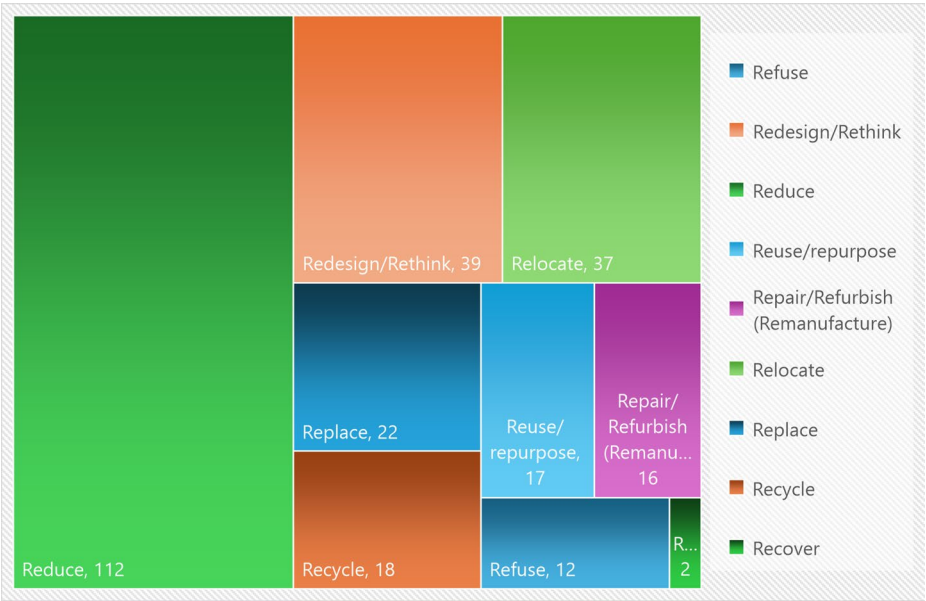


**Fig. 1** Prevalence of R categories for the circular economy in the 13 standards studied. Source: owned, 2024

the rejection of packaging, included 12 criteria, which, in addition to the use of resources, also reduce waste. Only two criteria were included in the Recover category, which is not surprising as energy from waste is not an activity that is particularly suited to the profile of tourism operators - although it is undoubtedly and crucial element of the circular economy.

In Table 3, the number of circular indicators identified in the standards examined is shown, broken down separately for the 9 R's, as well as the total number of indicators examined by the standard. In addition, the last column of the table shows the circular/composite ratio by adding up the number of indicators specifically identified as circular (adding the numbers in the 9 R column) and dividing it by the total number of indicators. The purpose of presenting this number was to illustrate how many indicators the given standard examines in total, so we were able to show what proportion of this is an explicitly circular type indicator.

The circular aspects are most prominent in the Nordic Swan and EU Ecolabel standards, especially in the Reduce category. In addition to the Reduce category, EarthCheck and Green Key also emphasize Replace, i.e., in addition to reducing consumption, they promote the concrete replacement of resource use with a more sustainable solution. It is interesting that EuroSpa has opted to rethink and reuse. GSTC and Travellife strongly emphasize the Relocate aspect, i.e., the preference for short supply chains and sustainable modes of transport. Nordic Swan also strongly emphasized the complete rethinking of the service.

It is important to note that the EarthCheck, Green Destination, Green Globe, Green Key, and TourCert standards are rating schemes based on the Global Sustainable Tourism Council criteria, and their criteria are very similar.

Overall, we see that most of the standards examined focus on environmental sustainability. Identifying elements of a specifically circular economy were identifying for 17% of all criteria. It can be seen that most of the requirements that can be classified as R's of the circular economy focus primarily on reducing resource use, which, in our opinion, is the zeroth step towards a circular economy. It can also be observed that, as in the case of the standards supporting legislation, regulation, and strategy making, the focus in the standards for service providers is on criteria that are strategic issues and decisions (e.g., short supply chains, product re-engineering, product rethinking). At the same time, practical elements such as Reuse, Recycle are less dominant in the standards.

## Discussion

Although the circular economy has gained considerable attention in recent years, its application in tourism remains under-theorised. There hasn't been much empirical validation of the 9R framework [26] terms of standards unique to the tourism industry. By investigating the operationalisation of CE principles as outlined in the 9R hierarchy in sustainability certifications, our study fills this theoretical gap.

The novelty of our research lies in the fact that it brings together several areas of sustainability and, within it, the circular economy in tourism: the measurement of sustainability through sustainability certificates and, on the other hand, the interpretation of the circular economy in tourism through the R's model. Through concrete quantification, the study has sought to examine the importance of the circular economy in tourism through the lens of certification marks supporting quality assurance and bridged these research gaps.

**Table 3** Frequency of the R categories of the circular economy in the standards studied

| Name of Standard | total nr of indicators | Refuse | Redesign/Rethink | Reduce | Reuse/repurpose | Repair/Refurbish | Relocate | Replace | Recycle | Recover | Total nr of CE indicator | Circular/ composite ratio |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| EarthCheck | 156 | 1 | 1 | 3 | 1 | 0 | 0 | 3 | 2 | 0 | 11 | 7.05% |
| EU Ecolabel | 67 | 1 | 1 | 11 | 3 | 3 | 2 | 2 | 2 | 1 | 26 | 38.81% |
| EuropeSpa | n.d. | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 2 | - |
| Global Sustainable Tourism Council (GSTC) | 522 | 4 | 7 | 26 | 3 | 0 | 12 | 1 | 2 | 0 | 55 | 10.54% |
| Green Destination | 84 | 0 | 4 | 4 | 0 | 0 | 1 | 1 | 2 | 0 | 12 | 14.29% |
| Green Globe | 44 | 0 | 3 | 4 | 2 | 0 | 0 | 0 | 1 | 0 | 10 | 22.73% |
| Green Key | 154 | 3 | 3 | 17 | 3 | 6 | 1 | 7 | 2 | 1 | 43 | 27.92% |
| GreenSign | 166 | 1 | 3 | 10 | 1 | 0 | 4 | 1 | 0 | 0 | 20 | 12.05% |
| ISO 9001: Quality Management Systems | n.d. | 0 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 6 | - |
| Nordic Swan | 58 | 1 | 8 | 7 | 2 | 3 | 0 | 2 | 2 | 0 | 25 | 43.10% |
| QualityCoast | 20 | 0 | 1 | 2 | 0 | 0 | 1 | 0 | 1 | 0 | 5 | 25.00% |
| TourCert | 88 | 0 | 1 | 12 | 0 | 1 | 3 | 1 | 0 | 0 | 18 | 20.45% |
| Travelife | 263 | 1 | 5 | 15 | 1 | 2 | 12 | 3 | 3 | 0 | 42 | 15.97% |

Source: own editing based on standards, 2024 (n.d. - not defined)

In our study, we have validated the 9R model of the circular economy way so that these categories can all be identified in sustainability standards available to tourism businesses. This analysis further supports the theory that all 9Rs can be interpreted in tourism.

Several studies (e.g [36, 37])., have analysed various sustainability indicators in tourism, but none of them have focused on the circular economy. While previous research has focused on the economic impact and marketing value of certifications specifically related to the standards that grant certification, these results demonstrate how circular economy aspects are reflected in these standards. Analysing the aspects, composition, and indicator set of standards has been an unexplored area, especially from a circular economy perspective. This study aims to bridge that gap by examining how circular principles is embedded in certification schemes. We contribute to a better understanding of the transformative potential of certifications, while also offering practical insights for policymakers and certification bodies seeking to align standards with circular economy goals.

Our results support those of Font and Lynes (2018), who argue that tourism sustainability certifications frequently lack a strategic focus on systemic change [105]. The results indicate that the Reduce category appears in each of the standards and is the most frequently used indicator in the quantification. Within the Reduce category, the standards primarily focus on the following specific measures: energy efficiency, waste minimisation, greenhouse gas emission reduction. Reducing resources used is a fundamental concept of sustainability and the circular economy, so this result is not surprising. It is perhaps the least effortful step, as we have already taken the first step by adopting energy-saving solutions. Furthermore, the application of Reduce methods does not involve significant financial outlay and will result in cost reductions over time. Bocken et al. (2016) point out that a "circular-lite" approach, which addresses efficiency without reaching full circularity, is frequently reflected in a narrow focus on reduction strategies [106].

However, if we consider the other elements of the circular economy, Reduce alone is insufficient, as the resource/material/waste used in this category is not recycled, and the cycle is not created. Thus, the standards apply a strong push towards sustainability by emphasising Reduce. Still, the other R categories should also be given more emphasis to create a real virtuous circle.

Regarding the other R categories, the following interventions appeared in the standards in the largest proportion:

- Redesign/Rethink: consumable and disposable goods, sustainable materials and construction practices, choosing sustainable vehicles and transportation.
- Relocate: alternative transport options, local suppliers are favoured.
- Replace: increase the use of renewable energy, sustainable purchasing.
- Recycle: composting, waste sorting.
- Reuse/Repurpose: rainwater harvesting, returnable/refillable containers for beverages.
- Repair/Refurbish (Remanufacture): vehicle maintenance, freezing equipment regularly defrosted.
- Refuse: avoiding single-used products, packaging, information about sufficient drinking water quality.
- Recover: heat recovery system.

These results build on existing evidence of Velasco-Muñoza et al. [70] regarding measuring the circularity of tourism activities but provide a new insight into circular tourism through the 9R approach. Since it contradicts Velasco-Muñoza et al. [70], our study uses the 9R model, not the EMF model. With these research results, we complement the work of Velasco-Muñoza et al. [70] and provide a deeper understanding of the circular economy in tourism certifications.

It is evident that too many standards are available, which causes considerable confusion among service providers. Due this fragmentation there is a need for simplification and standardisation. Furthermore, the current standards are not transparent (we excluded several standards from the analysis because their evaluation criteria are not public), which raises concerns for a tourism service provider about whether to even get involved in the certification process. Consequently, tourism service providers may reasonably question whether participation in such schemes is worthwhile.

At the beginning of our investigation, it became apparent that many freely available standards were primarily designed for policy-making purposes, targeting destination- or national-level decision-makers, rather than individual service providers. Based on these insights, we formulated three recommendations (a-c), complemented by three further proposals (d-f) based on the results of the empirical research. Beyond these principles, the following strategic pillars are needed to develop certification standards (managerial recommendations) further:

a) Defining the scope: a certificate specifically dedicated to service providers is needed, which, in addition to strategic guidance, supports the development of service providers with concrete, measurable indicators. To further support the certification and application process, the indicator set mostly asks for data that are already available due to other data requirements and therefore do not require extra data collection but aggregating them can help to move towards a circular approach.

   i. The certificates available are typically offered to accommodation providers and DMOs. It would be helpful to have a general set of fundamental indicators that can be understood by any organisation of any size involved in tourism, which could be complemented by sector-specific indicators depending on the type of operator.

b) Enhancing transparency: in many cases, the criteria and indicators required to obtain certification are not publicly available - as shown in this analysis - which makes it very difficult for service providers to anticipate the certification process. i. Transparency is essential, so service providers can decide easier which organisation they prefer to be certified by.

   ii. In addition, a transparent set of criteria would enable a better communication of certificates awarded if they were also available to consumers.

c) Differentiating between certifying bodies: issuers of the currently available standards are public, non-profit organisations or private companies. It is important to stress the advantages and limitations of each type. Standards issued by public bodies tend to be more detailed, based on existing concrete data, but may lack flexibility; non-profit

organisations tend to be independent of any economic interest and thus appear more independent and credible; economic principles guide private companies and thus often dominate the standards. Clear communication of these distinctions is important for service providers when selecting among competing schemes.

d) Beyond environmental aspects: a significant part of the standards examined focused on environmental results, with the social aspect also appearing several times. The more a certificate considers social, economic or cultural factors in addition to natural and environmental ones, the more effectively it can contribute to sustainable development and the circular economy at the global and local level.

e) Moving beyond resource reduction: Less use of resources is essential, but insufficient: the analysis clearly showed that "reduce" is the most commonly used aspect in the standards. It is also necessary to stress the presence of the other 'Rs' in tourism since Reduction, although undoubtedly very important, does not constitute recycling of either materials or waste.

f) Educating consumers: Nelson et al. (2021) found that tourists often lack understanding of green certifications, which limits their potential impact. In several cases, the standards include the expectation that service providers inform visitors about, for example [107], more sustainable travel options, and limit consumption, i.e. with automatically connected light sources or taps with reduced water flow. On the other hand, travellers need to be educated to navigate the certifications and be guided on sustainable practices and responsible tourism choices, as well as the meaning and content of the certifications. Improved public understanding of certification schemes would not only support more sustainable consumption patterns but also increase the visibility and impact of certified services.

Overall, by empirically mapping CE principles within existing tourism certifications, our research not only validates the theoretical applicability of the 9R model in the sector but also highlights critical gaps in its practical implementation. These insights contribute to advancing the circular economy discourse in tourism by moving beyond conceptual frameworks towards measurable, actionable indicators embedded in certification systems.

The study shows that by incorporating the above pillars into the standards, it is possible to go beyond a sustainability approach and precisely support the spread of the circular economy.

## Summary

In this study, we analysed internationally recognised tourism certificates tailored explicitly to service providers and their criteria, focusing on indicators that measure specifically circular solutions.

- The specific criteria (and availability) vary widely depending on the organisation or body carrying out the certification. Based on current analysis, we identified the typical focus areas of sustainable tourism certification, which can be summarised as follows: environmental protection: reducing the negative impacts of travel and its organisation on the environment, for example through energy use, waste generation, and travel itself.

- social responsibility: focusing on ethical solutions, preserving local cultures and values, and ensuring well-being.
- economic sustainability: supporting local businesses and using local products.
- cultural preservation: preserving traditions and heritage in the destination.
- sustainable management: responsible corporate governance, ensuring long-term sustainability.
- consumer education: informing travellers, guiding them, and promoting responsible consumption.

In addition to all these sustainability principles, the elements of the circular economy model are not dominant in the standards. However, circularity in tourism can be understood in all aspects of the above categories.

In the study.

- we have identified patterns in tourism certification that focus on the circular economy approach within/beyond sustainability: environmental aspects predominate, including optimal resource management, such as the use of energy-efficient devices and equipment, grey water use, and use of motion sensors.
- by examining the criteria set for the certificates, we quantified the proportion of circular criteria: 1622 criteria were analysed in the 13 standards reviewed, of which 275 were identified as circular indicators. This represents a rate of 16.95%. The average value ranges from a minimum of 7 to a maximum of 43%.
- we assessed the extent to which each of the principles within the 9 Rs of the circular economy is reflected in the certificates examined: Reduce is the most dominant circular category, aiming to reduce resource use. Redesign (Rethink) is the second most common element in the standards, which refers to modifying the product or service, for example, using sustainable and durable materials. A similarly important category is Relocate, creating short supply chains and eliminating transport.
- According to Kang and Nicholls (2021), when certifications are seen as credible and transparent, customers are more willing to pay for eco-friendly lodging [59]. Our findings go beyond this by demonstrating how the existing opacity and fragmentation in certification programs may damage this credibility and make it more difficult to successfully apply circular economy strategies.

Based on the results, narrowing resource flows is the most popular circular business model in the standards, which aims to improve resource efficiency, by using fewer resources, such as virgin raw materials, energy, water, per product or service. At the same time, due to the frequency of the “rethink” approach, the closing the loop type circular business model also often appears.

As a limitation of the research, it should be mentioned that although the authors have aimed to be specific and distinguish the 9Rs from each other, the analysis of the criteria of the standards may, of course, be subjective. Furthermore, for understandable reasons, the study focused on the criteria of the available and published standards, which significantly narrowed the study sample.

Expanding the geographical horizon of the research towards sustainability standards that are available to tourism service providers in Asia, Africa, Australia, and North and

South America could significantly contribute to the internationalization of the analysis. This would open up the possibility of comparing sustainability frameworks applied on different continents to gain a more nuanced picture of the diversity of global practices and the different regulatory and operational environments of individual regions. This addition would further strengthen the relevance and generalizability of the study in the international scientific discourse. On the other hand as a continuation of the research, we plan to present case studies of service providers who have successfully applied for a certificate and thus publish the practical implementation of the different circular solutions.

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**Data Availability** Data are available from the corresponding author due to restrictions like privacy or ethical concerns.

## Declarations

**Competing interests** The authors declare that they have no conflict of interest.



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