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SUSTAINABLE TOURISM IN THE CIRCULAR ECONOMY ERA: A GLOBAL INDUSTRY PERSPECTIVE

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ABSTRACT

The linear economy of today does not maximize the use of resources or encourage their recycling, reuse, or healing. Therefore, there has been a rise in interest in the Circular Economy (CE) among global stakeholders and policymakers. Adopting a circular economy approach offers tourism businesses an opportunity to enhance innovation and achieve resource efficiency through a system-intensive approach. The circular economy presents an opportunity for tourism destinations to recapture the positive effects of tourism on sustainable development and to create a positive feedback loop between businesses and the local community. Additionally, travelers need to understand how important this change to the CE model is for creating tourist awareness programs and accommodations, and for informing their visitors about their environmentally friendly policies. There are several ways the circular economy can be applied in the tourism industry, such as implementing recycling programs, reducing single-use plastics, encouraging visitors to participate in waste-reduction activities, promoting responsible tourism practices, and educating tourists about waste reduction and recycling. It is also helpful to reduce energy use; hotels, transit systems, and tourism sites should invest in energy-efficient technologies. Utilizing circular design and construction principles, such as using sustainable materials, integrating renewable energy sources, creating long-lasting, adaptable structures, and encouraging the tourism industry to recycle and repurpose materials and products to reduce the need to produce new ones continuously.
Keywords: *Circular Economy; Tourism Sector; Sustainable Development; Waste Generation; Renewable Energy; Recycling.*

1. INTRODUCTION

According to the United Nations World Tourism Organization and United Nations Environmental Programme (2012), tourism generates over 35 million tons of solid waste annually, increases water and land use, emits greenhouse gases, diverts wildlife, and reduces biodiversity (Gössling, 2002; Hall, 2010). According to the most recent research, the hotel industry generates 289,000 tons of solid waste annually, of which 79,000 tons are food waste, accounting for 9% of the total waste produced. Food waste in the hospitality industry accounts for half a billion tons (or $376 billion) of the waste produced in the US by hotels, restaurants, and supermarkets. The hotel industry spends more than $35 billion a year on catering and banquets, resulting in solid waste such as bones, rinds, and trimmings, among other leftovers (Mettler, 2023). Specifically, the 2021 food waste index report states that India produces about 68.7 million tons of food waste per year, of which 11.9 million tons are from the food service sector (United Nations Environment Programme). The litter generated by hospitality and tourism globally consists of the following:

Table 1: Waste Generation Patterns for Hotels and Hospitality Sectors

Waste materials	Percentages (%)
Organic waste	37-72%
Paper and cardboard	6-40%
Plastic	5-15%
Glass	3-14%

Sources: Pirani & Arafat, 2014

Given that tourism significantly contributes to economic growth, its associated environmental impacts are expected to intensify in the coming years (United Nations World Tourism Organization, 2020).

2. REVIEW OF RELATED LITERATURE

According to the United Nations Tourism Organization (2023), international tourism is projected to recover to pre-pandemic levels by 2024. A critical aspect of ensuring tourism's sustainability lies in monitoring environmental impacts, with waste generation and its proper management standing out as key indicators of environmental health (Global Sustainable Tourism Council, 2012).

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These factors provide insight into how responsible tourism is interacting with natural ecosystems. Gaffar et al. (2021) suggest that growing public demand for sustainable practices is prompting businesses to shift their operational models toward more environmentally conscious and user-friendly approaches. This transition aligns with the goals set by the Sustainable Development Goals (SDGs), particularly the aim of building a more sustainable and equitable future for all. One promising framework to achieve this vision is the circular economy (CE). As defined by MacArthur (2012), the circular economy is designed to be regenerative and restorative, offering an alternative to the traditional linear economic model of "take, make, dispose." In this system, resources are used efficiently for as long as possible, with an emphasis on extracting maximum value before recovering and regenerating materials at the end of their lifecycle. The primary goal of CE is to "close the loop" in product and resource cycles. The circular economy concept has evolved through multiple schools of thought and does not stem from a single origin. Scholars often trace its development to environmental economists such as Pearce and Turner, who built upon Kenneth Boulding's foundational ideas (Anderson, 2007; Ghisellini et al., 2016; Greyson, 2007; Heshmati, 2015; Murray et al., 2017; Su et al., 2013).

In contrast to the linear model, CE promotes a system in which no resources are wasted (Aestimum, 2017), aiming to derive the maximum possible value from materials and to minimize waste. Studies suggest that implementing CE could lead to economic savings of more than 1trillion dollars globally. Moreover, by narrowing and slowing material loops, CE can significantly reduce raw material consumption, waste output, emissions, and energy inefficiencies (Geissdoerfer et al., 2018). The hospitality industry, particularly the hotel sector, is well-suited for CE practices. As part of the broader tourism sector, hotels contribute significantly to both the economy and environmental resource consumption. Therefore, there is increasing pressure on hotels to adopt sustainable practices—reducing energy consumption, managing waste effectively, and limiting environmental degradation (Gaffar et al., 2021).

Circular economy principles support the development of innovative business models that foster economic growth while minimizing ecological harm (Kalmykova et al., 2018). In this way, CE not only promotes sustainability but also addresses broader environmental challenges (Sauvé et al., 2016), aiming to extend product lifespans and enhance resource efficiency (Gregson et al., 2015; Haas et al., 2015). Tourism continues to expand rapidly and is expected to see substantial global growth over the next decade. Recognized as the world's second-fastest-growing sector, tourism has increasingly contributed to global and regional economies (World Travel and Tourism Council, 2019). As a core economic driver, tourism plays a vital role in increasing GDP, generating employment, and supporting the development of local economies, often in synergy with other industries (Paramati et al., 2017). For these reasons, integrating circular economy principles into tourism development is essential for achieving long-term economic and environmental sustainability.

3. OBJECTIVE FOR THIS STUDY

The primary objective of this paper is to explore the integration of circular economy (CE) principles into the global tourism industry and evaluate their potential to promote environmental sustainability, economic resilience, and social responsibility. Specifically, the study aims to:

a) Examine key circular economy practices currently adopted within the tourism sector.
b) Assess the impact of these practices on reducing waste, conserving resources, and enhancing destination sustainability.
c) Identify barriers and challenges to implementing circular models in tourism.
d) Highlight policy measures, stakeholder roles, and innovative approaches that support the transition to circular tourism.

4. SCOPE FOR THIS STUDY

This research focuses on the global tourism industry, with attention to practices across accommodation, transportation, food services, and tourist experiences. The study encompasses:

a) An overview of CE principles as applied to tourism.

b) Case examples from different regions demonstrating successful circular practices.
c) Discussion of both supply-side (businesses, governments) and demand-side (tourists) roles in promoting circular tourism.
d) Consideration of international trends, industry standards, and sustainability certifications related to CE.

The paper does not limit itself to a specific country or destination, allowing for a comprehensive and comparative understanding of global trends and innovations in circular tourism.

5. METHODOLOGY FOR THIS STUDY

This study is based on a qualitative, descriptive research methodology, which involves:

a) Literature Review: A detailed examination of academic journals, industry reports, and case studies related to circular economy applications in tourism. Sources include peer-reviewed publications, international tourism and sustainability organizations, and government reports.

b) Case Study Analysis: Review of selected real-world examples where CE practices have been implemented in tourism destinations, hospitality businesses, and tourism-related infrastructure.

c) Comparative Approach: Identifying similarities and differences in circular economy adoption across various geographical contexts, tourism segments, and policy environments.

d) Secondary Data Collection: Utilizing reliable databases and publications from organizations such as the UNWTO, WTTC, Ellen MacArthur Foundation, and other sustainability-focused bodies.

While the research does not involve primary data collection (such as surveys or interviews), it synthesizes diverse secondary sources to derive insights, draw conclusions, and recommend strategies for adopting circular economy practices in tourism.

6. DEFINITION OF CIRCULAR ECONOMY IN THE TOURISM SECTOR

According to the Ellen MacArthur Foundation, in a "circular economy, resources never go to waste, and the environment is replenished. Products and resources are kept in circulation in a circular economy through recycling, composting, refurbishing, reusing, and maintaining. By severing the link between economic activity and the use of limited resources, the circular economy addresses issues such as pollution, waste, and biodiversity loss, as well as climate change.

6.1 The Adoption of Circular Economy Principles in the Hotel Industry

There are six principles of the circular economy (Gaffer et al., 2021), which are very important for the hotel industry and are also explained below:

6.1.1 Cascade Orientation

It involves storing a product longer in circulation and transforming it into multiple different types of products, which is the first CE principle. While some hotels are still in the early stages, most hotels have already recycled some of their products, such as amenities.

6.1.2 Waste Elimination

The elimination of waste is the second principle. This principle highlights the need to cut waste at every stage of the product design process, from start to finish. Except for the trash can, one hotel uses no plastic at all. They use biodegradable plastic, despite it costing 25% more than regular plastic.

6.1.3 Economic Optimization

The third principle emphasizes economic efficiency, which is essential for developing a resilient economy. During the pandemic, hotels generally did not face significant issues regarding raw material shortages or escalating costs. Instead, some adapted their pricing strategies by improving their menu selections, all while continuing to prioritize health and safety measures.

6.1.4 Maximization of Retained Value

Many hotels now follow a routine maintenance system that has become a common standard across the industry. This practice is essential for ensuring that equipment runs smoothly and to avoid unexpected breakdowns. To manage this effectively, some hotels have established specialized teams and maintenance programs.

6.1.5 Environmental Consciousness

Another key principle is fostering environmental awareness. Several hotels have begun incorporating technologies such as motion sensors to reduce electricity consumption. In addition, many properties provide guests with advice on reducing waste and saving energy during their stay. However, the responsibility ultimately lies with the guests themselves. While some travelers are mindful of their environmental impact, others remain less informed. In response, a growing number of hotels are working to reduce their use of plastics—especially in guest rooms—by eliminating items such as plastic toothbrush handles and other single-use amenities.

6.1.6 Leakage Minimization

The sixth and final principle focuses on reducing leakage as much as possible. This concept emphasizes the importance of extending product lifespans and ensuring they remain within the system for as long as possible. For instance, it involves measures to prevent contaminants from entering clean water sources and to maintain rooms free of pollutants.

7. BENEFITS OF THE CIRCULAR ECONOMY IN THE HOTEL INDUSTRY: ENVIRONMENTAL MANAGEMENT

Governments, the green movement in the hotel and tourism sector, and tourists have all grown more conscious of the need to address environmental degradation. Hotel managers and operators need to be prepared to act in an environmentally responsible manner to see noticeable improvement. Hoteliers in Sweden and Poland participated in a survey (Bohdanowicz, 2006) that revealed that their establishments have an environmental impact, albeit one that is frequently underestimated in magnitude. It is thought that hotel and tourism associations, including hotel corporations, play a significant role in encouraging environmentally conscious behavior and more sustainable practices among hospitality industry operators (CSD, 1999). Therefore, hotels must handle their waste. Additionally, hoteliers may be motivated by the benefits rather than being forced to do so if the benefits can be estimated. 75% of all environmental effects caused by the hotel industry are thought to be related to the overindulgence in energy, non-durable goods (both imported and domestic), and water, rather than emissions that were released into the soil, water, and air (APAT, 2002). It is estimated that the average hotel guest generates at least 1 kg of waste daily (IHEI, 2002). Of this waste, 50–60% could be recycled or used again (Smith et al., 1993). Therefore, waste represents a significant expense in terms of hauling fees; however, waste can be recycled, and its salvage value can be turned into income.

Although only a slight majority of respondents believe that environmental management could lower operating costs, Kasim (2009) asserts that environmental management is crucial to the long-term viability of small and medium-sized hotels. Therefore, it is necessary to quantify the benefits of waste management to persuade hoteliers to adopt it for environmental reasons. Cost-benefit analysis must be used to evaluate the effectiveness of waste minimization in clubs. In the UK, cost- benefit analysis, or CBA, is becoming more and more common for assessing investments and policies (Pearce, 1998). According to a survey on waste management revenue collected from eight Clubs in the UK, the reported financial savings are pretty impressive. Waste costs about £500,000. According to audits, the actual amount was £12,870,000, or 4.5% of total revenue—an estimated £3,000,000 in savings-roughly 1.1% of total turnover, which was thought to be feasible. A club similar to LWMI saved £747,000, or 0.26% of its overall turnover. £1,266,000 was saved overall in years one and two, or 0.47% of total turnover (Phillips et al., 2001). A recent study (Malik & Kumar, 2012) recommends practical solutions to reduce waste generation and improve waste management at a relatively low cost.

For instance, reducing or eliminating the use of plastic bags and liners in trash cans, switching from diluted to concentrated cleaning and laundry solutions, and replacing the supply of newspapers in rooms with newsstands strategically placed in busy areas like the restaurant or lobby. Purchase high-

thread-count fabric for longer-lasting clothing; switch to pump-style sprays rather than aerosol cans; and install refillable shampoo, soap, and other toiletry dispensers in guest rooms to eliminate used plastic bottles, wrappers, and soap fragments. Using soiled face, hand, and bath towels as cleaning cloths.

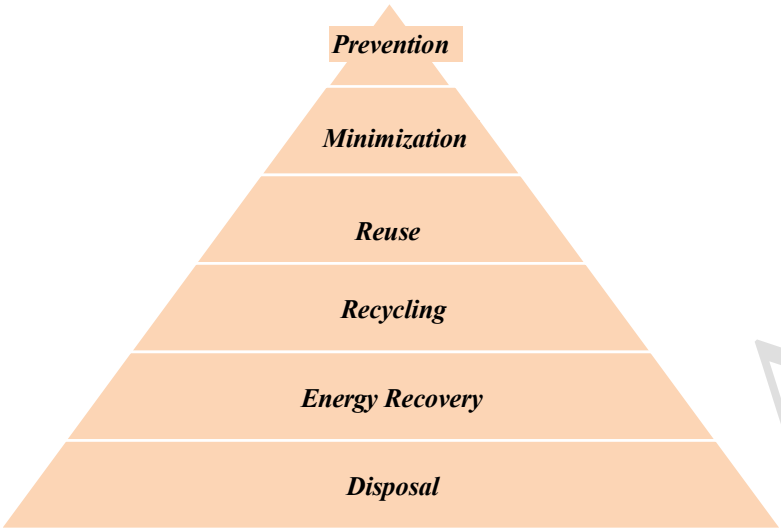

Fig. 1: Waste Hierarchy Source: Waste on Line (2006)

The European Union's (EU) waste strategy provided the model (Williams, 2005; Gervais, 2002). The waste hierarchy promotes sustainable waste management by ranking the most environmentally friendly options with the least negative environmental impacts (UK Government Strategy Unit, 2002). A variety of options are available to handle various waste streams, including prevention, minimization, reuse, recycling, energy recovery, and disposal. Waste introduced the waste hierarchy in 2006.

a) Waste prevention is the process of getting rid of waste earlier, before it is produced.
b) Minimization is the process of minimizing waste generated throughout a product's life cycle.
c) The practice of reusing waste materials prevents them from entering the waste stream.
d) Recovery is the process of recovering some of the material's value via energy and recycling.
e) At the last point of the hierarchy, disposal typically entails landfill and waste burning (Baker & Vandepeer, 2004).
f) Composting, a crucial SWM choice for sustainably managing organic waste, was not covered by the waste hierarchy, though (Webster, 2000).

The waste hierarchy is designed to prioritize waste avoidance. If not, it seeks to encourage waste recovery and re-use—composting and collecting food waste fall under the waste hierarchy's recycling phase. Waste should be disposed of only after all other options have been exhausted, usually in a landfill. A waste management strategy is more sustainable the higher up the waste hierarchy it is. The waste hierarchy is designed to prioritize waste avoidance. If it fails, it seeks to encourage waste recovery and reuse. Composting and food waste collection are included in the recycling process. Waste should be disposed of only after all other options have been exhausted (Nath, 2014).

8. BEST CIRCULAR ECONOMY PRACTICES IN HOTELS: THE PRODUCER AND CONSUMER PERSPECTIVE

According to Lopez & Girardin (2021), the best circular economy practices in hotels are described below:

a) Only turn on the heating or air conditioning when a customer enters the space.
b) Using a smartphone, guests can adjust the temperature of their room remotely. The room's air conditioning and heat are provided by self-produced renewable energy sources, such as solar panels, natural resources, geothermal energy, or lakes.
c) Provide fewer free room accessories (such as combs, shoe shine, and toiletries).
d) Toiletries are supplied in large quantities, and all room accessories are composed of natural materials.

e) Decrease how often you clean your towels, bed linens, and room cleaning.
f) Towels and linens are cleaned using all-natural, homemade cleaning solutions.
g) The cleaning crew receives training to clean a room with less energy and resources.
h) Recycle food waste (compost).
i) Utilize leftover food to create biogas.
j) Minimize food waste by sharing extra food and producing it when needed.
k) Cook mostly using food that you have made.
l) Adopt energy-saving measures in the spa, such as lowering working hours and preventing the pool or jacuzzi from overheating.
m) Rainwater can be stored for use in washing machines, toilets, and irrigation.
n) Cut back on water use (e.g., by controlling water flow).
o) Recycle grey water from visitor rooms (for irrigation, for example).
p) opt for energy-efficient electrical and electronic appliances (such as LED, A+++).
q) Construct or alter a structure that is carbon neutral.
r) Install devices to track and show visitors' energy and water usage.
s) Utilize your own renewable energy sources (like solar panels) and recycle gray water (for irrigation and toilets, for example).
t) Minimize the amount of furniture in the hotel, such as in the restaurant, lobby, and rooms.
u) Use of remanufactured furniture in hotel rooms, restaurants, and lobbies.
v) Encourage hotel visitors to use public transportation by providing a day pass for it.
w) Offer guests at the hotel eco-friendly modes of transportation (e.g., e-bikes, e-cars).

9. CIRCULAR ECONOMY PRACTICES IN THE TOURISM SECTOR

Conca Park has been engaging both guests and employees since 2014, and the results have been outstanding. With their help, the hotel correctly identifies 95% of waste. Additionally, the hotel used leftover breakfast food and vegetables, cutting waste production by 40% (Conca Park, 2020). There are 11Rs for best practices in the circular economy of the tourism sector, and encourage the sustainability (Acampora, Preziosi, & Merli, 2020).

a) Refuse: It is an important element, since it modifies the life cycle of the product/activity entirely. Actually, during this initial stage, consuming less and making fewer purchases helps prevent waste and overconsumption. Specifically, deciding not to purchase or avoid using specific products, understanding, for instance, hazardous materials, and refraining from specific actions, like stopping suppliers (Potting et al., 2017).

b) Re-Servitization: It is the culmination of all the recent developments. This component addresses virtualization (such as the use of apps), the performance economy, and the sharing economy, since the Circular economy needs to adapt to current stimuli to be integrated effectively. Users in this situation contribute positively to the environment by reducing emissions and consumption (Acampora et al., 2020).

c) Reduce: It involves using fewer raw materials, cutting back on waste, and increasing the efficiency of the consumption process. It is feasible in several ways, including the implementation of new technologies, streamlined packaging, or smaller, more portable goods. Enhancing the hotel's economy and social well-being while using fewer resources is the goal (Manniche et al., 2017).

d) Regenerate: It includes returning food and byproducts to the biosphere. Regenerate is the R that is closest to the food area (such as the kitchen). Natural composting provides an example, as does systematized composting, which expedites this process (Reike et al., 2017).

e) Re-Use: Products that are reused are those that are used once more for the same purpose. From an economic standpoint, it is among the most intriguing instruments because it uses less energy, labor, and resources than other activities while having an apparent positive environmental effect by reducing harmful emissions. Those products are based on a design that requires multiple production cycles to meet high guest demand. Second-hand goods could serve as an illustration (Potting et al., 2017).

f) **Repair:** It refers to actions that enable a defective product's life cycle to be extended. Reusing things frequently does not require much energy or money. The repair can be done in-house at the hotel or assigned to a repair business (Reike et al., 2017).

g) **Refurbish:** A product that has been "refurbished" still has its general structure, but certain parts have been replaced, fixed, or altered aesthetically. Reike et al. (2017) state that the intention is to extend the product's life, even if it is of lower quality than the original.

h) **Remanufacture:** In this instance, remanufacturing entails disassembling the product's structure. This process of fixing or replacing the structure results in the creation of a brand-new product with the same function (Potting et al., 2017).

i) **Repurpose**: It takes into account how the product is used to entirely new purposes, either in its entirety or in parts (Potting et al., 2017).

j) **Recycle:** The most popular and well-known circular economy strategy is recycling. It describes processes where waste is extracted and repurposed into new goods, resources, or materials that serve the same or different purposes. Energy recovery is not included; only organic reprocessing is (Manniche et al., 2017).

k) **Recover:** It comprises the final stage that is most similar to the linear economy, in which a product's biomass or energy is extracted from its waste stream (Reike et al., 2017).

9.1 Steps to follow the circular tourism method as a tourist

There are five important steps to follow the circular tourism method. According to Oreve (2015), this diagram explains the following steps, which are important to tourists.

a) Sustainable tourism opportunities offered by the tourism agencies
b) sustainable tourism service providers
c) environmentally friendly Transport option
d) Sustainable stay
e) feedback between tourists or professionals to enhance the sustainable offer

9.2 Recommendations for Implementing Human Circular Tourism

The way travelers behave is crucial to the shift towards the HCT because their decisions and actions influence how well circular strategies are implemented. To improve their lifestyle and behavior in this new model, tourists must become more aware of the HCT. This study makes some recommendations. The environmental, sociocultural, and economic dimensions comprise the three primary divisions. The suggested behaviors for travelers to follow throughout the various stages of travel—imagining, planning, reservation, experiencing, and sharing the moments—are practical and doable (Nocca et al., 2023; Flognfeldt, 2005).

According to Occa Et Al., there are three main dimensions of Circular Economy Recommendations:

a) Environmental Dimensions

To be a responsible tourist," To reduce waste," "To reduce emissions," and "To reduce the consumption of non-renewable resources" are the four categories that make up the environmental dimension. The first main category, "To be a responsible tourist," focuses on paying attention to specific aspects of the tourist experience and on the traveler's responsibility, primarily manifested in decisions made prior to departure. The suggested actions include selecting venues that offer carbon-positive activities, buying goods from businesses that practice environmental responsibility, and paying attention to the data travelers receive from monitoring sensors in lodging buildings or on modes of transportation (Bosone & Nocca, 2022). In fact, selecting eco-friendly accommodations depends on both the visitor's responsibility and the facilities' ability to effectively communicate the tactics and steps taken to achieve sustainable practices (Pencarelli et al., 2011). In fact, everyone has a responsibility to address waste and poor resource management. Governments and other authorities must not only create new policies and reorient existing ones; all individuals also have a responsibility to break free from the hyper-individualist dimension in their everyday decisions and deeds, both as individuals and as societies (Girard, 2021).

b) Economic Dimensions

The second government recommendation is the economic dimension, which is also playing a vital role. At the economic level, future actions are connected to tourist input to support local economies, for example, through locally made handicrafts and products. The main target is to promote handicrafts to help preserve the culture.

c) Socio-Cultural Dimensions

They are linked, at a socio-cultural level, to the exchange and sharing of information and culture between visitors and local communities, as well as to the preservation of the integrity and authenticity of local heritage and values. The interviewees' primary association with the concept of sustainable tourism is the valuation of cultural and natural heritage, as evidenced by the results of the previous survey (Bosone & Nocca, 2022).

It is clear from the aforementioned factors that being a responsible tourist requires first being a responsible citizen who can balance their personal needs with those of the environment and the community. Citizens must be "educated" to know the values, such as intrinsic values (Girard &Nijkamp, 1997), which transcend instrumental values and, when combined with them, form the image and identity of a site (Girard & Vecco, 2019). This is necessary to support the city's human development.

10. CONCLUSION

Therefore, in situations where sustainable development is seen as unsuccessful when applied inside a linear economy paradigm of production, the circular economy provides an alternative. The idea of scientists in Sustainable development, with an emphasis on environmental economics, endures, despite past failed attempts. A society that practices sustainable development has a macro-level goal that encompasses broad concepts of ecological sustainability across the economy and development. In contrast, a consumption-and-production model at the micro level primarily characterizes the circular economy approach. When circular approaches are implemented, sustainability outcomes improve. The circular economy turns into an instrument for long-term growth (Geng & Doberstein, 2008). Over the past ten years, a great deal of research has been done in academia, business, and government around the notion and principles of the circular economy (CE). The circular economy (CE) is increasingly gaining attention for its potential to minimize environmental impact by reducing emissions, lowering raw material use, and fostering innovative business opportunities. Above all, it promotes more sustainable and efficient consumption patterns (Tunn et al., 2019; Shpak et al., 2020). While tourism is widely recognized for its contribution to employment and economic growth, its importance goes beyond that. It holds a pivotal role in managing natural resources responsibly, aiming to reduce waste production and support environmental conservation. For this reason, transitioning the tourism industry toward a circular economy model is essential to reducing its ecological footprint and ensuring long-term sustainability.

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