

Integrating Circular Economy Principles in the Tourism Industry: challenges and opportunities for Romania

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Abstract

The tourism industry, one of the largest and fastest-growing economic sectors globally, is also a significant contributor to environmental degradation through resource consumption, waste generation, and carbon emissions. Integrating circular economy (CE) principles into tourism offers a transformative opportunity to address these issues by promoting waste reduction, resource efficiency, and the regeneration of natural systems. This paper explores the potential of the circular economy in tourism, focusing on the adoption of CE practices such as resource recovery, product life extension, and circular design in accommodations, transport, and tourism-related services, focusing on Romania. Key challenges include the industry's dependency on linear economic models, lack of awareness, regulatory barriers, and fragmented supply chains. On the other hand, opportunities arise from technological innovations, growing consumer demand for sustainable travel, and the potential to reduce costs through resource efficiency.

Keywords: Tourism, sustainability, circular economy, sustainable travel.

JEL Classification: L83, Q56, O13, Q01, R11

1. Introduction

Tourism is one of the fastest-growing sectors worldwide, making a substantial contribution to economic growth, employment generation, and poverty alleviation (Lee S., 2009). In 2019, prior to the pandemic, it directly or indirectly supported 334 million jobs, accounted for 10.4% of global GDP (USD 10.3 trillion), contributed 28.3% to global service exports, and represented 14.3% of global investments. By 2023, the travel and tourism sector contributed 9.1% to global GDP and created 27 million new jobs. Projections suggest that by 2033, its share of global GDP will rise to 11.2%, and its contribution to employment will reach 13.4%. According to the 2023 report from the United Nations World Tourism Organization (UNWTO), tourism activities have nearly returned to pre-pandemic levels. While tourism plays a vital role in driving economic growth and influencing global mobility, it also faces criticism due to its environmental impact. The sector has been linked to various environmental challenges, including high energy consumption (Zhu S., 2022), pollution, ecological degradation, and the generation of substantial waste (Surdez-Perez et al., 2024, Allkins, 2025). Additionally, the construction of tourism infrastructure,

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such as roads, airports, and other facilities, contributes further to environmental concerns.

The tourism industry is a vital component of Romania's economy, offering unique cultural, historical, and natural attractions that draw millions of visitors annually. From the picturesque Carpathian Mountains to the Danube Delta and the medieval charm of Transylvania, Romania's diverse landscapes and rich heritage position it as a competitive player in the European tourism market. However, the rapid growth of tourism has also brought environmental and social challenges, such as resource depletion, waste generation, and the degradation of natural ecosystems.

Romania's tourism sector has demonstrated significant growth in recent years, with notable increases in both domestic and international visitors. In 2023, the number of arrivals at accommodations in Romania reached 13.6 million, while in the first nine months of 2024, the total stood at 11.15 million (Statista, 2025). These visitors collectively spent around 5.2 billion lei (approximately 1 billion euros) during their stays. Overnight stays also rose by 3.4%, totaling 15.975 million. Domestic tourists comprised 82.9% of arrivals, while international visitors accounted for 17.1%. Among foreign tourists, the leading countries of origin were Germany (128,900 arrivals), Italy (117,800), and Israel (83,100).

Despite these positive developments, the recovery of international tourism in Romania has been slower compared to domestic tourism. As of 2023, the number of foreign tourists remained about 25% below pre-pandemic levels. Nevertheless, the hospitality sector is poised for expansion, with plans to add nearly 2,000 rooms between 2024 and 2026, indicating a commitment to both quantitative and qualitative growth.

2. Circular Economy in the Tourism Sector

The Circular Economy (CE) is an economic model designed to minimize waste (Morseletto, 2020) and maximize resource efficiency by encouraging the reuse, repair, refurbishment, recycling (EllenMacarthur Foundation), and sustainable management of materials and products throughout their lifecycle, an economic system that represents a paradigm shift in how human society interacts with and depends on nature (Prieto-Sandoval et al. 2018). Unlike the traditional linear economy (Nart, 2021), which follows a take-make-dispose approach (Bugain, 2020), CE seeks to keep resources in use for as long as possible, extract maximum value from them, and regenerate natural systems. This approach reduces environmental impact, improves resource efficiency, fosters innovation, and contributes to economic resilience and sustainability (Davies & Egas 2022).

Traditional tourism models rely heavily on a linear economy, characterized by resource-intensive practices that contribute to resource depletion and environmental pollution. Tourists, on average, generate 1.67 kilograms of waste

per day (Gruber et al., 2017), significantly exceeding the waste levels of local households. This disproportionate waste generation highlights the sector's substantial environmental impact. Transitioning to a circular economy offers a viable solution to these challenges by promoting the sustainable use and management of resources within the tourism industry (Allkins, 2025).

One important element of CE in tourism is resource recovery, which involves implementing waste management systems that prioritize recycling and composting. For example, hotels and resorts can adopt practices such as composting food waste (Maleforst, 2019, Delgado, 2023) and recovering energy from organic materials. In this regard, waste disposal systems should be restructured to ensure that reusable materials are separated and processed in a way that reduces the environmental footprint of the tourism sector. Hotels and resorts could also use technologies that help manage energy and water consumption more effectively (Manniche, 2017), ensuring that these resources are reused as much as possible.

Product life extension is another key principle in circular tourism, when it comes to reuse (Lopes de Sousa Jabbour, 2018). This involves extending the lifecycle of tourism-related products, such as furniture, linens, and equipment, through repair, refurbishment, and reuse. Instead of discarding items once they become worn, businesses in the tourism industry can invest in repair services, repurpose old furniture, or buy second-hand items that can be refurbished to maintain functionality and appeal. For instance, older but well-maintained hotel furniture could be refurbished and reused rather than replaced with new products, cutting down on waste and conserving resources.

Circular design encourages the creation of tourism-related facilities and services that are modular, repairable, and recyclable. Tourism infrastructure such as eco-lodges, resorts, and even local transportation systems can be designed with sustainability in mind, using sustainable materials that are both durable and recyclable. The aim is to reduce environmental impacts through the use of materials that can be repurposed or disposed of in an environmentally friendly way, making it easier to recycle or reuse components once they reach the end of their useful life. This could include designing buildings with energy-efficient systems or using construction materials like bamboo, recycled metal, and natural stones that have a smaller environmental footprint.

Furthermore, sharing economy models (Naydenov, 2018) can contribute to resource efficiency by encouraging travelers to share resources through platforms like car-sharing services and vacation rentals. By sharing transportation or accommodation, travelers can minimize the need for additional infrastructure and reduce energy consumption. For example, car-sharing services reduce the need for each traveler to own a car, thus lessening the overall demand for fossil fuels and decreasing vehicle emissions. Likewise, vacation rentals encourage

the use of existing housing stock, reducing the need for the construction of new hotels or resorts, which can have significant environmental and resource costs.

While the potential for implementing CE in tourism is great, the transition to a circular model faces several significant challenges (Kirchherr et al., 2018). One major barrier is the dependency on linear models, where products are made, used, and then disposed of. The tourism industry's current infrastructure and business models are built around a linear "take, make, dispose" approach, which is in stark contrast to the principles of circularity. Transitioning to a circular economy requires significant investments in new systems, processes, and technologies, which can be complex and costly. For instance, hotels and resorts would need to upgrade their waste management systems, redesign facilities, and train staff to handle circular practices, which could be financially burdensome for some businesses.

Another challenge is the lack of awareness and education surrounding the benefits and practices of the circular economy. Many tourism stakeholders, including businesses, consumers, and local communities, may not fully understand what a circular economy entails or how it can benefit them. Without education and awareness campaigns, the adoption of CE principles could be slow, as many may continue to rely on traditional linear models that prioritize short-term profits over long-term sustainability. Stakeholders need to be educated on how circular practices can lead to both environmental and economic benefits, such as reducing operational costs, attracting eco-conscious travelers, and contributing to the local economy.

Regulatory barriers also complicate the widespread implementation of CE in tourism. Different regions often have inconsistent regulations, standards, and policies regarding waste management, resource recovery, and environmental impact. These disparities can create confusion and inefficiencies for businesses that want to adopt circular practices but are hindered by local or national laws. Harmonizing regulations across regions and ensuring that businesses have access to clear guidelines can help overcome this challenge.

The fragmentation of supply chains in tourism is another obstacle. The tourism industry involves a wide range of stakeholders, including hotels, transportation providers, tour operators, local governments, and communities. Each stakeholder may have different goals, resources, and constraints, which can make it difficult to coordinate circular practices across the entire sector. Collaboration and alignment between these stakeholders are crucial for the successful implementation of CE principles in tourism, yet achieving such coordination is often a complex task.

Despite these challenges, there are several promising opportunities for advancing the circular economy within the tourism industry. One such opportunity lies in technological innovations. Emerging technologies such as the Internet of

Things (IoT), blockchain, and smart sensors can play a crucial role in enhancing resource tracking, waste management, and energy efficiency. For example, IoT devices can monitor energy use in real-time, enabling businesses to optimize their resource consumption and reduce waste. Blockchain technology can help track the provenance and recycling of materials, ensuring transparency and accountability in the circular economy.

Additionally, consumer demand for sustainability is steadily increasing, with more travelers seeking environmentally responsible experiences. This growing demand provides a strong market incentive for tourism businesses to adopt circular economy practices. Consumers are increasingly prioritizing eco-friendly accommodations, low-impact transportation options, and sustainable tourism activities, which creates a competitive advantage for businesses that embrace circularity.

The cost savings that come from resource efficiency and waste reduction present another compelling reason for businesses to consider CE. By reducing waste, conserving water and energy, and reusing products, businesses can cut down on operating costs in the long run. For example, hotels that implement energy-saving measures, like LED lighting or water-efficient systems, can significantly lower their utility bills. Furthermore, reducing waste can lower disposal costs, benefiting the bottom line.

Lastly, collaborative models among stakeholders, such as partnerships between governments, businesses, and non-governmental organizations (NGOs), can drive collective action towards the adoption of CE practices. Governments can provide incentives, subsidies, and clear regulations that encourage circular practices, while businesses can collaborate to share resources, knowledge, and best practices. NGOs can play a key role in raising awareness and educating consumers and businesses alike about the benefits of CE. By working together, stakeholders can overcome the challenges of fragmentation and create a more sustainable tourism sector.

3. The Romanian context: challenges to circular economy adoption in Romania's tourism industry

The CE is becoming increasingly important in Romania, establishing itself as a core pillar of the country's sustainable development strategy (Nowak-Marchewka, 2025), but the adoption of CE principles in Romania's tourism sector is confronted with a range of interconnected challenges that require significant attention and action to overcome.

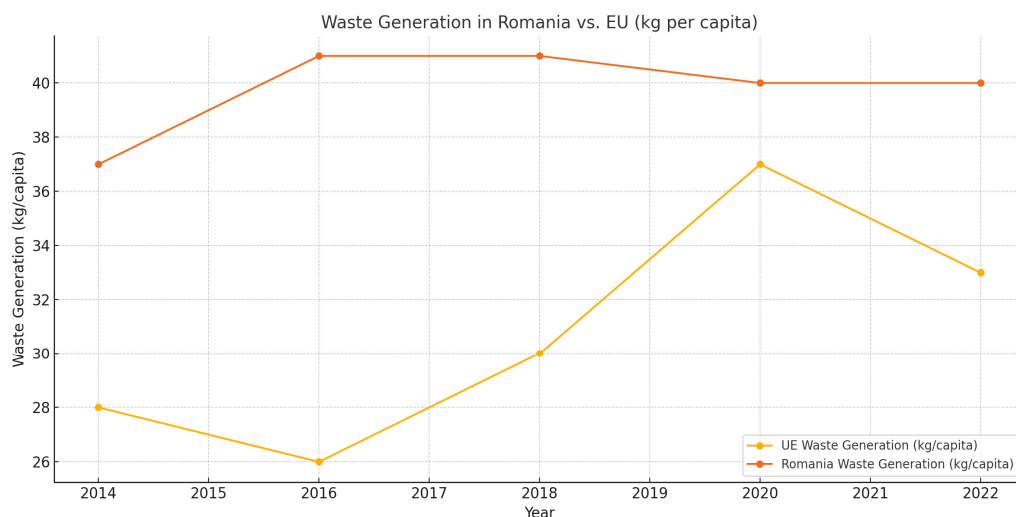
One of the primary obstacles is the widespread lack of awareness and education regarding CE principles (Ministerul Mediului, 2022). Many tourism operators remain unfamiliar with the concept and its potential to drive sustainability and cost efficiency. This gap in understanding is not limited to the

supply side; consumers, who are key drivers of demand for sustainable practices, often lack the necessary knowledge to prioritize and support CE-driven tourism services. Without sufficient awareness, the push for environmentally conscious practices remains weak, undermining efforts to shift the industry toward sustainability.

Regulatory and policy-related barriers present another critical challenge. Although Romania has developed national strategies that emphasize environmental sustainability, there is a noticeable absence of specific regulations and tailored incentives to promote CE practices within the tourism sector. For example, laws and policies that encourage waste reduction, resource efficiency, or green certification for hospitality businesses are either lacking or poorly enforced. Bureaucratic inefficiencies, combined with inconsistent enforcement of existing environmental regulations, create further disincentives for businesses considering the adoption of circular principles. These hurdles foster an environment where linear practices persist, perpetuating wastefulness and environmental degradation.

A clear example of the need for improved waste management and circular practices in Romania's tourism sector can be seen in the comparison of waste generation between Romania and the EU. As shown in Figure 1, Romania consistently generates more waste per capita than the EU average, despite its lower levels of economic activity. This disparity highlights the urgent need for targeted interventions to reduce waste and align Romania's tourism sector with CE principles.

Figure 1. Waste generation in Romania vs. EU (kg per capita)



Source: Eurostat, 2025

Financial constraints add yet another layer of difficulty, particularly for small and medium-sized enterprises (SMEs), which dominate Romania's tourism industry. The implementation of CE practices, such as investing in renewable energy, efficient waste management systems, or sustainable infrastructure, often requires substantial upfront capital. For many SMEs, the lack of access to affordable financing options and the absence of financial incentives, such as grants or tax breaks, create significant barriers. Consequently, even those businesses that are aware of CE benefits may find themselves unable to adopt such practices due to resource limitations.

Infrastructure deficiencies further compound these challenges, especially in rural and remote tourist destinations where waste management and recycling systems are underdeveloped or entirely absent. Effective CE implementation relies on facilities for proper waste segregation, recycling, and environmentally sound disposal, but such infrastructure is often inadequate or nonexistent in key tourism areas. This limitation not only hinders businesses but also places additional strain on local environments, as waste accumulates and natural resources are depleted without effective management.

Finally, cultural resistance to change represents a less tangible but equally significant challenge. Traditional business models, which prioritize short-term profits over sustainability, remain deeply entrenched within the tourism sector. Similarly, consumer habits are often shaped by convenience and familiarity, favoring the linear "take-make-dispose" model over more sustainable approaches. Overcoming these long-standing behaviors requires more than just policy changes; it demands a concerted effort to raise awareness, educate stakeholders, and cultivate a cultural shift toward sustainability.

These challenges, though significant, are not insurmountable. They highlight the need for a comprehensive and coordinated approach that addresses the economic, infrastructural, regulatory, and cultural dimensions of Romania's tourism sector. Only by tackling these barriers holistically can CE principles take root and transform the industry into a sustainable driver of economic growth.

4. Opportunities for integrating circular economy principles in Romania's tourism industry

Despite the challenges, Romania's tourism sector presents numerous opportunities to integrate Circular Economy (CE) principles and promote sustainability. A significant opportunity lies in the supportive policy framework established by the Romanian government, including the National Strategy for the Circular Economy (SNEC) and the National Action Plan for Circular Economy (PAEC). These frameworks provide a foundation for specific incentives such as tax breaks, grants, or subsidies. For example, tax incentives could encourage

hotel chains to install renewable energy systems like solar panels or adopt waste-reducing measures such as composting organic waste.

Capacity building and education also offer significant potential to advance CE adoption. Developing comprehensive training programs for hospitality workers can improve their understanding of sustainable practices, such as energy conservation or waste management.

Educational campaigns aimed at tourists can promote responsible consumption, such as reducing single-use plastics. For instance, collaborations with academic institutions like the University of Bucharest or industry organizations such as the Romanian Tourism Employers Federation could facilitate the creation of sustainability workshops and awareness campaigns.

Innovation and technology are transformative forces that can accelerate CE integration. Digital platforms, such as local sharing economy initiatives, can reduce resource use while enhancing tourist experiences. For example, platforms like Viscri 125, which promotes rural tourism, could integrate technology to share resources such as accommodation or transport more efficiently. Technological advancements, such as smart water systems in hotels or energy-efficient appliances, can also minimize environmental impact while cutting operational costs. An example is the use of keycard systems in hotels to control electricity use, ensuring that energy is consumed only when rooms are occupied.

Community engagement represents another critical opportunity. Local communities can be actively involved in designing and implementing CE-driven tourism practices that align with their cultural and environmental values. For instance, in the Maramureş region, traditional crafts and sustainable farming practices could be integrated into tourism offerings, creating authentic experiences while supporting local livelihoods. Additionally, waste management programs could involve communities, such as establishing local recycling hubs or composting facilities in rural areas.

Finally, the global shift toward sustainable tourism creates a growing market for environmentally conscious travel options. Romanian tourism businesses adopting CE principles can tap into this demand by offering eco-friendly experiences, such as stays in green-certified accommodations or guided tours focused on nature conservation. For example, the Danube Delta, a UNESCO World Heritage Site, could attract eco-tourists by emphasizing biodiversity preservation and sustainable activities like birdwatching and kayaking.

These examples underscore the potential for CE principles to transform Romania's tourism industry into a model of sustainability. By leveraging policy support, fostering education, embracing innovation, engaging communities, and meeting global market demand, Romania can build a resilient and sustainable tourism sector.

5. Conclusion

The integration of Circular Economy (CE) principles into Romania's tourism industry represents a transformative opportunity to address pressing environmental challenges while enhancing the sector's resilience and competitiveness. As one of the fastest-growing industries globally, tourism plays a pivotal role in Romania's economy, contributing significantly to GDP and employment. However, the reliance on traditional, linear economic models has led to resource depletion, waste generation, and environmental degradation, necessitating a shift toward more sustainable practices.

Romania faces unique challenges in adopting CE principles within its tourism sector. These include a lack of awareness and education among stakeholders, regulatory gaps, financial constraints, and underdeveloped infrastructure. For instance, despite notable growth in tourism, waste generation in Romania remains significantly higher than the EU average, illustrating the urgent need for targeted interventions. Furthermore, the dominance of small and medium-sized enterprises (SMEs) in the tourism sector complicates the transition due to limited access to financial resources and sustainable technologies.

Despite these barriers, Romania is well-positioned to capitalize on the opportunities presented by CE adoption. Supportive policy frameworks, such as the National Strategy for the Circular Economy (SNEC) and the National Action Plan for Circular Economy (PAEC), provide a solid foundation for sustainable development. Technological innovations, including smart energy and water management systems, digital platforms for resource sharing, and waste recovery technologies, can accelerate the transition to circularity. Additionally, consumer demand for sustainable tourism experiences is growing, creating a competitive advantage for businesses that prioritize environmental responsibility.

Key principles of CE, such as resource recovery, product life extension, circular design, and sharing economy models, offer practical pathways for reducing waste, conserving resources, and minimizing the environmental impact of tourism activities. For example, implementing composting and recycling programs in hotels, refurbishing tourism-related products, and integrating eco-friendly materials into infrastructure design can significantly enhance resource efficiency. Moreover, community engagement and education initiatives can foster cultural shifts toward sustainability, empowering local populations to participate actively in CE practices.

In conclusion, Romania's tourism sector stands at a crossroads, with the potential to become a model of sustainability in Europe through the adoption of Circular Economy principles. By addressing economic, regulatory, infrastructural, and cultural barriers holistically, the sector can transition from a resource-intensive model to a regenerative and resilient one. Embracing CE not only aligns with

global sustainability goals but also positions Romania as a leader in eco-tourism, ensuring long-term economic and environmental benefits for the country and its communities. Through collaborative efforts among policymakers, businesses, and local stakeholders, Romania can unlock the full potential of the Circular Economy, driving innovation, sustainability, and economic growth in its tourism industry.

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