Innovation and Sustainability in Urban Tourism: An Analysis of the Dual Role of Innovation through the Triple Bottom Line Concept

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Abstract

On the one hand, innovations accelerate tourism development; on the other, they can cause negative consequences in urban centers. Although they are often used to stimulate growth and meet desired sustainability standards, their potential to transform the sector is undoubtedly great. Regulation is highlighted as an important instrument for shaping an innovative and sustainable environment. In order to achieve goals in all three dimensions of sustainability, it is necessary to direct innovations in such a way that they simultaneously address economic, environmental, and social effects. By presenting examples of innovation applications through the Triple Bottom Line concept, the paper explores the positive and negative consequences of their implementation. In conclusion, innovations in urban tourism generate double effects, with negative consequences most often manifested in the environment and the local community.

Keywords: urban tourism; sustainability in tourism; innovation in tourism; dual role of innovation in tourism

Type of paper: Research article

Received: Sep 21, 2025
Accepted: Sep 10, 2026

DOI: 10.2478/crdj-2026-0012

Introduction

There is a growing need for the implementation of sustainable tourism practices. This paper aims to examine how specific examples of innovative practices can boost sustainability and economic efficiency in tourism. Using illustrative examples, different aspects of innovation and its impacts on tourism will be analyzed. To cover the full range of innovation's impacts on tourism, examples with positive and negative consequences have been selected. One of the most important global problems is the growing phenomenon of overtourism, which can seriously undermine sustainability standards.

Primarily, overtourism is characterized by an excessive number of tourists in certain destinations that exceed available capacity, putting pressure on the environment, infrastructure, local communities, and cultural heritage. The consequences are visible in the form of pollution, excessive consumption of natural resources, and disruption of social norms, especially in terms of labor rights and the quality of life of residents, which threatens the long-term sustainability of destinations. The World Tourism Organization (1998) also emphasizes the need for sustainability to avoid compromising the future realization of needs. The World Tourism Organization (2013), on the other hand, emphasizes the need to harmonize sustainability goals to maintain the competence of market entities.

Given these challenges, which will be addressed in the literature review, the goal is to present and critically evaluate innovative approaches related to sustainability dimensions. Selected examples provide insight into various approaches to managing and balancing the economic interests of tourism with the needs of environmental protection and the quality of life of the local population. In addition, research indicates that consumers with relevant knowledge and information are willing to pay more for more sustainable products and services (Ganglmair-Wooliscroft et al., 2025). In particular, this suggests that the problem does not necessarily arise from the sphere of purchasing power, but from the sphere of supply or availability of innovative, sustainable products and services.

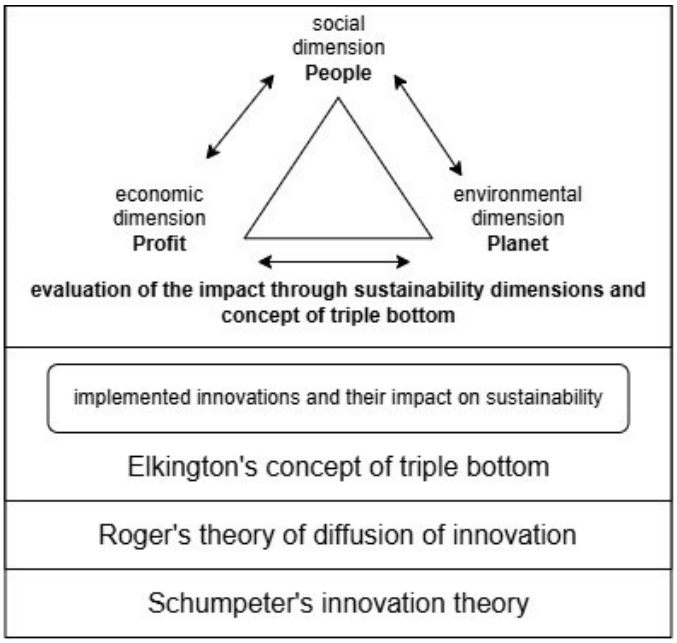
The paper begins with an introductory chapter and continues with a chapter on the theories used, including Schumpeter's theory of creative destruction and Rogers' theory of the diffusion of innovation. This is followed by Elkington's concept of the Triple Bottom Line, which was used to analyze individual examples, i.e., to examine the consequences of innovation across the dimensions of sustainability. A literature review follows this, followed by a chapter explaining the selected methodology. The study results are presented as text paragraphs, a table, and a graphic explaining the impacts on the dimensions of the Triple Bottom Line. The paper ends with a discussion, the study's limitations, and a conclusion.

An overview of the used theories

This paper is based on three key theoretical frameworks that help analyze the relationship between innovation and sustainability in tourism. Schumpeter's theory of creative destruction is used to understand why this process is necessary in the context of achieving sustainability. Rogers' theory of innovation diffusion provides insight into how new practices are adopted. Finally, Elkington's concept of the Triple Bottom Line (TBL) serves as an analytical tool for assessing the impact of innovative practices on all three dimensions of sustainability: economic, social, and environmental, or, in the context of the Triple Bottom Line, people, profit, and planet. Figure 1 graphically illustrates these theoretical concepts.

Figure 1

Theoretical framework for analyzing the impact of innovation



Source: Author's illustration, 2025.

As a key driver of change in tourism, Schumpeter's (1934) theory of creative destruction serves as the starting point. Schumpeter's theory suggests that creative destruction transforms inefficient processes, services, and products into efficient ones. This theory provides a starting point for understanding how innovation creatively changes existing tourism models, creating new value and transforming inefficient processes (Hajar et al., 2023). It is the transformative power of innovation that makes it an ideal subject of observation in urban tourism, and especially in the context of sustainability. Accordingly, Barbier (1987) emphasizes that transformation towards sustainability primarily requires political will, as well as financial and technical resources.

Utterback (1974) points out that innovation goes through several key steps. The first step involves generating an idea, which is then used to solve a specific problem (*problem-solving*). The last step is implementation and diffusion of the technology. However, the speed of innovation dissemination can vary depending on socioeconomic conditions. Rogers' (2003) diffusion of innovation theory explains the speed of diffusion and implementation of innovations within communities. In this context, early adopters play a crucial role, as their quick and successful adoption of innovative approaches sets an example for other entities in the tourism sector, speeding up the overall process of dissemination and implementation. However, Dibra (2015) emphasizes that all entities need to take steps towards achieving higher levels of sustainability, i.e., that innovations that are in the process of diffusion need to be adapted to adequately solve the relevant challenges and problems related to the development of sustainability in tourism. The challenge is that tourists change their consumption habits and ethical behavior during vacations and holidays, making it even harder to achieve a more sustainable tourism sector (Ganglmair-Wooliscroft & Wooliscroft, 2016).

This paper discusses three key dimensions of sustainability: the economic dimension, which focuses on financial sustainability and economic prosperity; the social dimension, addressing the effects on human well-being and fairness; and the environmental dimension, which refers to ecological integrity and resource conservation (Strezov et al., 2017). Given the examples presented in this paper, Elkington's (1997) concept of the Triple Bottom Line applies. This theory allows assessment of innovation through three dimensions (Nogueira et al., 2025): economic (earnings), social (people), and environmental (planet Earth). Furthermore, Elkington's TBL theory provides a useful framework for a comparative analysis of implemented innovations in the context of sustainability.

The theoretical framework for this study is built on the understanding that innovation can serve multiple goals whose consequences extend beyond mere economic efficiency and encompass significant environmental and social aspects.

Literature review

The global challenges faced by communities in tourist destinations, such as overcrowding, infrastructure burdens, or population displacement, are complex and interconnected. While these problems manifest themselves at the local level, innovations in tourism, such as digital marketing and short-term rental platforms, often unconsciously contribute to their emergence. That is why it is crucial to explore how innovation, which is often seen as a solution, can also be part of the problem, creating a vicious circle of negative consequences for local populations and ecosystems.

Tourism consists of many heterogeneous activities (Aldebert et al., 2011). Tourism is growing even though this growth runs counter to the goals of sustainability and environmentally friendly business (Campos et al., 2022; Higgins-Desbiolles, 2018). Thanks to implemented technologies (Stryzhak, 2022) and lower airfare prices that

make tourism more accessible to the general public (Papatheodorou, 2021), tourism has become a major presence in urban centers, where it creates demanding challenges that are sometimes difficult to solve. Local communities face significant consequences, including strain on infrastructure and city services and congestion, which significantly increases real estate prices and makes them inaccessible to residents, ultimately driving residents to emigrate (Hristov et al., 2021). The problem of the unavailability of real estate begins with the excessive use of properties for short-term rentals, leading to a shortage of housing stock (Mikulić et al., 2024), which is further intensified by the conversion of real estate into tourist facilities to accommodate tourists, especially in tourist centers (Khotcharee & Fukushima, 2023). The problem becomes more serious when regularly employed people, including young people, cannot solve the housing issue, which is also important for starting a family (Russo & Salerno, 2023), thus expanding the problem into a demographic context. Residents then fight against overtourism (Milano et al., 2024) because they are aware of the negative impacts on their standard of living.

Global sustainability challenges in tourism are diverse. In Europe, studies focus on overtourism (Valente et al., 2022), impairment of residents' quality of life, and the impact of short-term rentals. The consequences include pressure on the real estate market and social changes such as gentrification. Similar challenges are present in other regions. Asia faces sustainability issues and heavy infrastructure burdens (Zeng et al., 2021). North America is seeing growth in short-term rentals, which also drives gentrification and displaces local populations (Kubeš & Kovács, 2025). These problems, including gentrification, also affect Africa's regional hubs (Horn & Visser, 2023). In South America, the tourism industry faces critical infrastructure-related sustainability challenges. A significant increase in energy consumption and waste generation is predicted if the sector remains unsustainable (Pardo Martínez & Cotte Poveda, 2024).

Therefore, the common denominator is the unsustainable growth of mass tourism. It significantly affects urban centers, displaces indigenous populations, and thus poses a universal global challenge. While tourism growth benefits the economy (Pardo Martínez & Cotte Poveda, 2024), its gradual, different, and increasingly pronounced negative effects on urban areas can offset the initial economic benefits.

Global challenges manifest in specific ways within local communities (Rastegar & Ruhanen, 2022), where their effects become most visible and direct. Global challenges include climate change, which can lead to the destruction of local ecosystems on which tourism depends (Baloch et al., 2023), while overtourism puts pressure on local populations, increases the cost of living, burdens the provision of public services (primarily related to local utilities), and impairs the quality of life (Nopiyani & Wirawan, 2021). Conflicts between locals and tourists (Zhu et al., 2022) and seasonal employment (Yabancı, 2023) are becoming increasingly pronounced socioeconomic problems that accompany the already known overgrowth of tourism.

Urban tourist destinations represent a specific context of global challenges. Population density, complex infrastructure, and high concentration of tourism activities make them particularly vulnerable (Bui et al., 2021). Overtourism in cities often leads to traffic congestion, increased pollution, degradation of historic districts, and the already mentioned reduction in the availability of residential properties for residents (Żemła, 2024). Waste management, water and energy supply, and cultural heritage preservation have become critical issues. In addition, urban tourism can contribute to gentrification and the displacement of local entrepreneurs and populations (Horn & Visser, 2023). Therefore, innovative approaches can offer an effective solution for the sustainable development of urban tourism. There are strong arguments for applying innovation to address global challenges in tourism (Jawabreh et al., 2025), especially if these challenges are treated locally (Żemła, 2024). Local policies must create an enabling framework and encourage the implementation of these innovations to mitigate global challenges at the local level.

Contemporary tourism, especially in urban centers, faces the challenge of excessive tourist numbers that cause infrastructural strain and environmental degradation (Mohamed Al Matris, 2023). In this context, innovation is emerging as a key driver of sustainable tourism development, offering solutions to decentralize tourism flows, optimize resources, and boost the local economy (Štreimikienė et al., 2021).

One of the primary goals of innovation in sustainable tourism is decentralizing tourist traffic (Štreimikienė et al., 2021), thereby reducing pressure on popular urban destinations. This is achieved through an integrated approach that includes pricing strategies, improved public transport, and digital promotion (Anthony Jnr, 2025). For example, innovative billing models and differentiated rental prices for accommodation outside central urban areas can financially steer tourists toward lesser-known but equally attractive destinations (Andrei et al., 2024). To achieve an efficient system, the availability and efficiency of public transport should be improved in parallel to better connect rural areas with urban centers (Ceder, 2021).

Furthermore, digital platforms play an increasingly important role in this process. Developing digital platforms to promote lesser-known destinations enables the effective presentation of authentic experiences outside traditional tourist hotspots (Tripathi & Wasan, 2021). Platforms supported by sophisticated big data analysis can identify niches, tailor offerings to individual tourism interests, and, most importantly, direct tourist traffic in the off-season (Theodorakopoulos et al., 2025). This results in a better distribution of tourism activity throughout the year and the promotion of year-round tourism.

However, while innovations are often presented as a solution, they can also have negative effects, contributing to gentrification and displacing local populations. For example, short-term rental booking platforms provide new opportunities for property owners. However, they are turning apartment buildings into tourist accommodation,

significantly reducing housing supply for locals and driving up property prices. This problem particularly affects young couples and families, who find it increasingly difficult to find affordable housing, with long-term impacts on the demographic structure and social cohesion of urban centers (Russo & Salerno, 2023). Also, technological advances and organizational innovations in air transport, such as low-cost flights, have enabled mass tourism, increasing the availability of tourist destinations, but also the excessive demand for them (Graham, 2013). Digital marketing, while useful for promotion, often highlights lesser-known local places, leading to rapid discovery and overtourism without adequate measures to manage tourist flows.

Despite the growing number of local initiatives and innovations aimed at addressing global challenges (Smith & Stirling, 2018), comprehensive global case studies that systematically examine the application of local innovations to global tourism challenges remain scarce (Elkhwesky et al., 2024). While there are many examples of individual cities that have successfully implemented certain innovations (Galego et al., 2022; Gupta & Vegelin, 2016), there is a lack of systematic comparative analysis at the global level. The existing literature mainly focuses on national or regional examples, with multinational and global comparative research limited to a very small number of studies (Elkhwesky et al., 2024). However, this study aims to compare innovative practices and their impact on sustainability. In addition, such a comparison can provide insight into the conditions under which the application of innovation contributes to, and under which it potentially undermines, sustainability. Specifically, it can offer an understanding of important characteristics about innovation, which is that the impact of innovation may depend on the purpose and manner of its application, and not on the innovation itself; i.e., if they focus only on the economic aspect of sustainability, the environmental and social aspects of sustainability are potentially neglected. This suggests that innovation can create challenges and problems for local populations as a by-product, whose negative consequences may outweigh the achievable benefits.

In the modern tourism economy, innovation is often seen as a driver of growth, but not as a potential source of negative externalities if these innovations are not directed in line with sustainable goals (Dyck et al., 2023; Escobar & Hall, 2025). Consequently, even when profits are effectively internalized, negative externalities remain, placing an excessive burden on local infrastructure and undermining community and environmental well-being (Camilleri, 2018). In the context of smart cities, this problem becomes even more prominent (Escobar & Hall, 2025). The failure to internalize social and environmental costs, in an environment where uncontrolled innovation can optimize resource use, can also accelerate negative processes (such as gentrification) in which business goals are driven exclusively by profit-centric logic (Dyck et al., 2023). Therefore, a holistic analysis of tourism innovation requires a shift toward a systematic understanding of sustainability, where technology not only serves economic efficiency but also actively addresses the destination's environmental and social challenges and requirements.

A comprehensive comparative analysis would be pivotal to draw broader conclusions, identify best practices, and facilitate the transferability of solutions across different sociocultural and institutional contexts (Galego et al., 2022). Without this, knowledge about the effectiveness of local innovations in addressing global challenges remains fragmented and localized, limiting their potentially broad impact. In addition, tourism platforms positively affect tourism development. However, innovation should cover all dimensions of the user experience and the heterogeneity of the tourism value chain, which further complicates holistic innovation in tourism and the assessment of its effects.

Methodology

This paper is based on an analysis of secondary sources, i.e., a review of existing scientific and professional literature and newspaper articles, deductively linked to the concept of the Triple Bottom Line to illustrate the dual role of innovation in urban tourism. Rather than an isolated analysis, the study uses heterogeneous examples across different tourism development contexts (Lundberg, 2015) as the primary methodological approach to identify the positive and negative effects of innovation in tourism. Also, the heterogeneous example approach serves to illustrate the contrasting phenomenon of the impact of innovation, where, for example, the innovative Copenpay initiative is used to direct tourists towards sustainable goals, which are often overlooked if they do not necessarily bring profit (Dyck et al., 2023), while innovation in the airline industry has priority due to the main focus on profit and serves exclusively the goal of cost repositioning (Camilleri, 2018), which consequently makes the air transport service more affordable to the wider population.

Thus, the analysis begins with individual phenomenological insights, using *purposive sampling* to reveal the dual impact of innovation in tourism through individual examples. Further critical analysis draws on existing reports, documents, and scientific articles on related areas that provide insight into the partial impact of innovations within the heterogeneous tourism value chain. This analysis aims to substantiate phenomenological insights with fragmented knowledge in the literature on the dual impact of innovation in tourism, to reduce bias when inferring from individual phenomenological insights. Since the phenomenon of the dual role of innovation in tourism is not widely and systematically observed and documented, but individual insights create a picture of the true impact of innovation in tourism that is obviously not uniform, it is very challenging to conduct empirical research or research with primary data until the mechanism of the dual impact of innovation in tourism is completely phenomenologically clear (Kovács & Szabó, 2024). Various sources provide a precise illustration of the theoretical tensions between technological progress and sustainability, i.e., they can show that innovations (Schumpeter, 1934) are used to upset the balance within the Elkington triangle (Elkington, 1997), as well as to establish a balance, but this probably depends on the alignment of goals with sustainability. It should be noted that the application of innovations can depend on the human factor,

i.e., the method of application, motives, and ethics of human conduct. Accordingly, the human decision to apply innovation in different contexts can (consciously or unconsciously) result in undesirable consequences for society and the environment. Therefore, when applying innovations, it is necessary to keep in mind the wider negative, i.e., positive, consequences of the innovation that is the subject of application and evaluate its wider effects.

In addition, the paper attempts to cover a wide range of positive and negative consequences of innovation. The use of heterogeneous examples ensures the credibility of the findings because different types and levels of innovation are covered, thus enabling a deeper understanding of the complexity and width of the phenomenon. This approach enables research into how innovation affects sustainability and economic efficiency, which is primarily observed through the economic dimension of sustainability, i.e., *profit* as a component of Elkington's Triple Bottom Line concept.

Although the paper uses a heterogeneous approach to examples, the selection of specific examples was based on *purposive sampling* in accordance with three key methodological criteria to ensure maximum relevance and robustness of the analysis (Campbell et al., 2020). First, each analyzed example had to provide sufficient insight to illustrate the dual nature of innovation in tourism authentically. The examples should also show how innovation generates negative consequences, which was analyzed through a literature review, and how it supports sustainability. Another key criterion was to ensure full coverage of the dimensions of the Triple Bottom Line concept. Because the paper focuses on the Triple Bottom Line framework, examples were selected to provide background that encompasses all three dimensions of innovation's impact, avoiding a focus solely on economic impact. Finally, the examples are selected to be geographically and contextually dispersed, encompassing different types of urban destinations with different socioeconomic and regulatory environments, to minimize the risk of regional bias and improve the external validity of the findings.

The research follows a deductive analytical framework. Elkington and Schumpeter's theoretical concepts serve as the primary conceptual framework for interpreting the insights drawn from the examples. Although the presence of innovation could initially be interpreted as a positive impact on economic development, through a comparative approach and Elkington's concept, the study seeks to offer a comprehensive insight into the impact of innovation on the sustainable development of tourism, pointing out that economic development does not develop simultaneously with the environmental and social dimensions. Tourism as a complex system requires a multidimensional analysis that integrates economic, social, and environmental aspects of sustainability. This is exactly what positions Elkington's concept, which combines the dimensions of profit, people, and planet Earth, as a comprehensive approach to evaluating innovation.

A comparative analysis of heterogeneous examples is particularly suitable for understanding the diversity of innovation impacts, which can, on the one hand, foster

sustainable development and the local economy and, on the other, contribute to unintended consequences such as gentrification and the displacement of local populations. This methodological approach enables the identification and categorization of such effects in different socioeconomic, cultural, and infrastructural contexts. In addition, comparative analysis can identify transferable and adaptable best practices across tourist destinations, increasing the use of innovation potential for sustainable development.

In conclusion, in addition to using the usual table to systematize the findings, the study uses a modified evaluation approach, inspired by the approach for systematic analysis (Ellet, 2018, p. 63), to visualize and systematically present the impacts through a graphical representation.

Innovative management of challenges in tourism

Below, through seven concrete examples, this analysis examines how these challenges are addressed in practice through innovation and the consequences of such application across all three dimensions of the Triple Bottom Line.

Cost repositioning in the airline industry

Cost repositioning in the airline industry is a strategy aimed at minimizing operating costs to enable cheaper transport for passengers and tourists to distant destinations. The innovative concept of this strategy relies on the optimization of the boarding and disembarkation process, whereby the use of traditional and expensive *gates* at airports is reduced or completely avoided. Instead, passengers access the plane via bus or a direct pedestrian corridor, which is significantly more cost-effective than using gates and the associated infrastructure. This approach reduces the cost of ground operations and frees up space at the airport, creating additional passenger traffic for the airport, which is a desirable feature in attracting new airlines (Dobruszkes, 2013; Francis et al., 2006; Graham, 2013). However, low-cost companies compensate for lower ticket prices by generating additional revenue through intensive sales of services and products during the flight. This business model makes air transport accessible to a wider population, encouraging tourism growth and connecting remote regions to the global market. Cost repositioning thus becomes an economical and affordable alternative to the traditional air transport model (Francis et al., 2006).

Nevertheless, this strategy carries significant social and environmental challenges. Workers are often under pressure to maximize in-flight sales of additional services, leading to stress, dissatisfaction, and poor working conditions (Graham, 2013; Warhurst & Nickson, 2007). From an environmental perspective, air travel is one of the largest sources of greenhouse gas emissions in the tourism industry. While the model reduces costs, it contributes to climate change (Schäfer et al., 2019). Beyond the social and environmental implications, lower airfares drive growth in passenger numbers to

popular destinations, making this organizational innovation one of the drivers of overtourism described in the previous chapters, with consequent pressure on local infrastructure, the environment, and the community (Koens et al., 2018).

So, although profitable and well developed, this business model raises issues of workers' rights, negative environmental impacts, and increased tourist traffic, which can lead to overtourism.

Digital marketing in the function of attracting tourists

Digital marketing is one of the most important tools of modern tourism for attracting and engaging tourists. By using a wide range of digital channels such as social networks, search engines, applications, and websites, tourist destinations and agencies can significantly increase the visibility of their offers and directly reach potential visitors with targeted campaigns (Mallick, 2023). Additionally, this approach to advertising and reaching global customers benefits local development (Bonina et al., 2021). Digital marketing also allows precise monitoring of user behavior and analysis of interests, resulting in more effective campaigns and personalized communication (Dhankhar et al., 2023).

As noted in the literature review, digital marketing can encourage mass tourism, but it can also be used to raise awareness and guide tourists toward more sustainable alternatives. Marketing campaigns can use educational and visual content to raise awareness among tourists about the possibility of using sustainable practices such as using bicycles for transport within the city, or public transport, or pointing out that tap water is drinkable and that they do not have to buy bottled water (Kamel, 2024; Ranatunga et al., 2023). In this way, digital marketing becomes a tool for promoting responsible tourism and reducing negative environmental impacts (Ganglmair-Wooliscroft et al., 2025).

In short, digital marketing in tourism enables more effective promotion of destinations and products. However, its full potential probably lies in directing towards more sustainable behavior and reducing the negative environmental and social consequences of mass tourism. Therefore, positive impacts can be significantly expanded, and the following example shows how digital marketing can be used.

Copenpay – transforming tourism into a terrain for change towards sustainability.

Copenpay is an innovative initiative of the tourism organization Wonderful Copenhagen, launched as a pilot project in 2024, which aims to encourage sustainable tourist behavior through a reward system. A newspaper article entitled ″Copenhagen, Normandy, Exmoor: European destinations where tourists are rewarded for good behavior" (Hughes & Lahiri, 2025) explains the concept, which uses innovative methods to encourage tourists to behave sustainably in European tourist destinations.

The concept is based on the idea that tourists, instead of traditionally paying only with money, "pay" with their sustainable (in)acts such as using public transport, renting bicycles, choosing more environmentally friendly alternatives, and participating in local actions such as cleaning. For these actions, tourists receive points they can use to access cultural and recreational attractions in the destination for free, such as museums or wellness facilities. As stated on the news portal Drivingeco (Noriega, 2024), research shows that most tourists want to act sustainably but often lack motivation or concrete tools to do so. Copenpay is an innovative concept that connects tourists' desire and motivation with sustainable behavior. For example, the program rewards environmentally friendly arrival in the city, including trains, electric cars, and the use of sustainable aviation fuel (SAF).

However, although Copenpay is an outstanding example of linking digital and organizational innovation to redefine the tourist experience and make it more sustainable, it remains unclear how such behavior affects the tourism sector as a whole. Although the initiative drives a positive shift in behavior, not all tourists will join the program so that unsustainable behavior will remain among some tourists. Therefore, Copenpay offers an excellent tool for directing behavior toward sustainability. However, the challenge remains how to realign all tourists, i.e., absolutely the entire sector, on the track of sustainable tourist behavior or business, balancing economic, environmental and sociological benefits.

Booking applications

Booking applications and digital platforms such as Airbnb and Booking.com further illustrate the dynamics described in the literature review: increasing short-term rentals reduces the availability of housing for locals, driving *displacement* from urban centers, especially in popular destinations where overtourism increases pressure on infrastructure (Butler & Dodds, 2022; Capocchi et al., 2019; Garay-Tamajón et al., 2022).

Although platforms have a positive effect on local development (Bonina et al., 2021) and can stimulate the spatial and temporal distribution of tourist flows beyond seasonal pressures (Bumbak, 2024; Li et al., 2020), the obvious negative consequences in the sociological and environmental dimensions, caused by the potential lack of sustainable practices, call for the necessary regulation that would protect the quality of life of residents in such urban tourist centers.

The population is well aware of the problem, which further emphasizes the need to address these challenges; the current antagonism of the local population, especially toward mass tourism, can be seen in social tensions and movements against overtourism (Çiçekdağı, 2025; Milano et al., 2024).

Hives and honey production at a hotel in Prague

In Prague, a hotel has implemented an innovative urban beekeeping initiative on its rooftop. This practice involves maintaining bee colonies to produce local honey, which the hotel offers to guests at breakfast. This activity directly supports environmental sustainability by boosting urban biodiversity and pollination, aligning with sustainable environmental goals (Patel et al., 2021). Economically, this innovation offers potential benefits by producing a unique local product, improving the guest experience, and potentially reducing honey procurement costs (Zhang, 2025).

Rooftop beekeeping in Prague is a multi-benefit initiative that brings significant environmental, social, and economic benefits. This practice supports the urban ecosystem and biodiversity by pollinating plants in city gardens and parks, thereby maintaining healthy flora and fauna (Patel et al., 2021). Furthermore, it contributes to environmental sustainability by reducing the carbon footprint, as producing local honey reduces the need for transportation (Prodanović et al., 2024), and bees serve as a natural indicator of environmental health. The initiative also has an educational dimension, connecting guests with nature and raising awareness of the importance of beekeeping and sustainable practices. On the socioeconomic side, offering its own honey adds value, differentiates the service, and strengthens the hotel's image as an innovative, sustainable entity.

While challenges such as pesticide exposure and limited space remain, planting bee plants can help mitigate them. Ultimately, urban beekeeping on the rooftops of hotels in Prague is a sustainable practice that enriches urban life and provides concrete benefits on multiple levels.

Growing food at the top of a hotel in Bangkok

In Bangkok, an innovative initiative focuses on urban rooftop agriculture and the circular economy, aiming to address sustainability challenges through local food production and biowaste recycling. This initiative represents a complex, multidimensional approach to sustainability that addresses environmental impact reduction and economic and social aspects (Manríquez-Altamirano et al., 2020). In terms of environmental impact, growing food locally and recycling food waste as a resource significantly reduce "food miles" (Gardner, 2016), thereby lowering transportation-related greenhouse gas emissions and supporting more efficient waste use in the urban environment (Appolloni et al., 2021). This approach also helps alleviate

the urban heat island effect, as plants and rooftop green spaces reduce ambient temperature, increasing microclimate comfort and the city's resilience to climate change and heat waves, respectively (Dong et al., 2025; Han et al., 2024).

Economically, local rooftop food production can significantly reduce food procurement costs, lower transportation costs for ordered food, reduce waste disposal costs, and improve the hotel's bottom line. This model also creates a differentiated and attractive offer for guests, showcasing a commitment to sustainability in an innovative way.

Socially, these practices foster awareness of the circular economy and sustainable practices among residents and visitors, serving as an educational tool and inspiration for other urban centers facing waste and limited resources. This example in Bangkok shows how integrating the circular economy and urban agriculture can catalyze sustainable urban development, providing multiple benefits and the potential to scale this model to other cities facing growing environmental and socioeconomic challenges.

Automated check-in system in a hotel in Antwerp

In Antwerp, the hotel has implemented advanced automated check-in with biometric scanning of identity documents to improve operational efficiency and guest experience. This embodies multiple technological innovations with a focus on sustainability, especially the economic dimension. Economically, automation streamlines operations by reducing labor costs and administrative bottlenecks, increasing hotel efficiency and competitive positioning. In health and social terms, by minimizing physical contact during check-in, this innovation improves health and safety standards critical in the context of the pandemic. It may reduce the need for physical infrastructure and printed materials, slightly lowering resource consumption. Socially, while it offers guests more flexibility, as there is the option to check in at any time, this system supports urban resilience by allowing visitors to flow more easily and can impact urban mobility patterns, as "flexible check-in" allows tourists to use public transport that encourages off-peak travel and reduces congestion, which is in line with sustainable goals within Antwerp.

However, the social dimension also poses challenges, including digital accessibility and equity issues. Dependence on the availability of biometric identity documents, different biometric standards (Amini & Javidnejad, 2024), and digital literacy levels can exclude certain groups of users, such as older visitors or those who lack technological knowledge, potentially reducing inclusivity and affecting the overall guest experience (Vieira et al., 2022). As noted, reducing physical contact from a health perspective was a positive aspect, especially during the pandemic (e.g., COVID-19), when physical distancing was a public health priority. However, given that tourism is a service activity that is normally based on interaction, reducing human contact is not necessarily a positive development, which raises the question of what implications lowering the level

of human contact has on people or on the social dimension of sustainability, and how this potentially affects competitiveness and loyalty between hotel and guest. This raises important questions about how local digital infrastructure policies and regulations can mitigate disparities by promoting accessibility, privacy, and security standards. Furthermore, the integration of such technological innovations into urban tourism strategies requires coordinated management to ensure alignment with broader sustainability goals and community values. Additionally, eliminating the need for hotel staff to perform check-in operations actually partially reduces seasonality in hiring (Amirulloh Anwar et al., 2024; Mahalakshmi & Bharath, 2025).

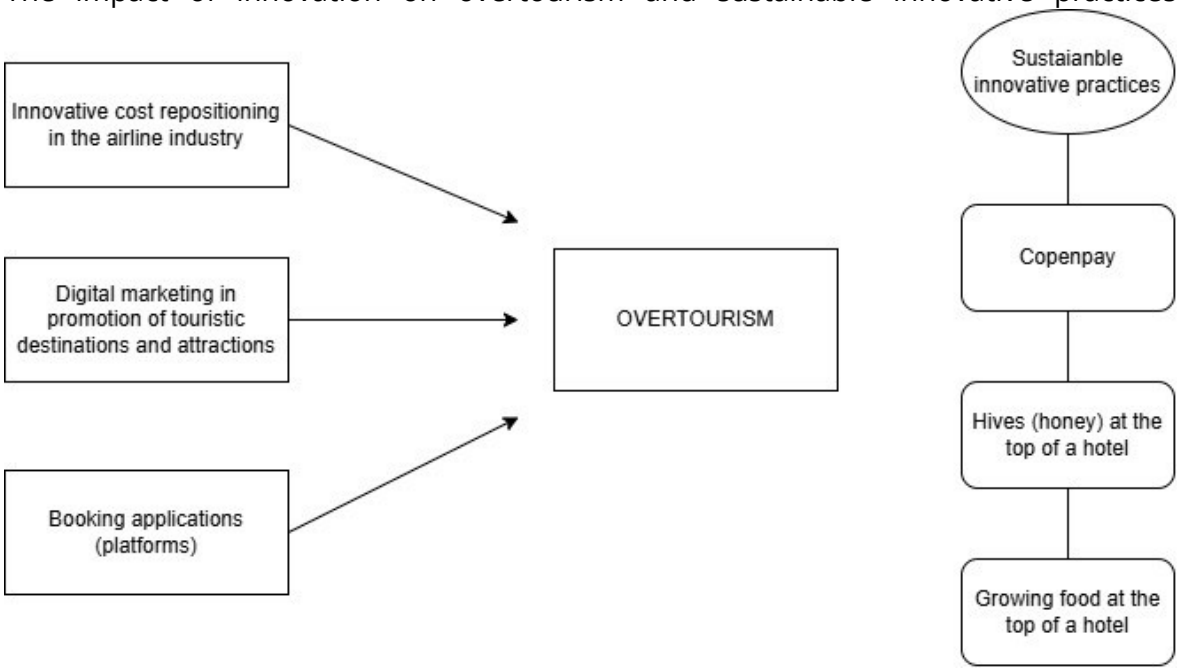
In summary, Antwerp's automated check-in innovation shows how technological advances can drive operational gains and support sustainable urban tourism by improving health security and shaping mobility patterns. Still, its success depends on addressing digital inclusivity and regulatory frameworks, highlighting the need for policies that balance efficiency, user accessibility, and social equity to ensure comprehensive sustainability in the urban hospitality sector.

Results of the analysis of the examples

Global urban centers are increasingly adopting integrated strategies for sustainable development, combining technological innovation with environmental practices. Antwerp is an example of a city that strategically fosters innovation and digitalization to improve sustainability, energy efficiency, and citizens' health (Manjon et al., 2022). A hotel in Prague illustrates how individual entities can contribute to the city's broader urban green development efforts. However, a single hotel cannot support conclusions about the city's overall practice. Nevertheless, the context for such individual initiatives is partly provided by the city's broader policy. As a member of the European Union's Climate Resilience Program, Prague has included promoting green initiatives in its strategic development plans, creating a more favorable framework for activities such as local food production and urban beekeeping (Živělová et al., 2022). Bees not only provide pollination services but also serve as reliable indicators of environmental health, as their presence and vitality reflect habitat quality and pollution levels (Farias et al., 2023). In Asia, Bangkok also faces the challenges of population density and the urban heat island effect. However, it supports urban agriculture and circular economy initiatives through incentive measures (Limprapoowiwattana et al., 2026) aimed at reducing waste and achieving local food self-sufficiency, while also developing strategies to mitigate negative impacts through green corridors and urban renewal. These practices can illustrate the global trend towards a holistic approach to urban planning that encompasses the environmental, social, and economic dimensions of sustainability.

Figure 2

The impact of innovation on overtourism and sustainable innovative practices



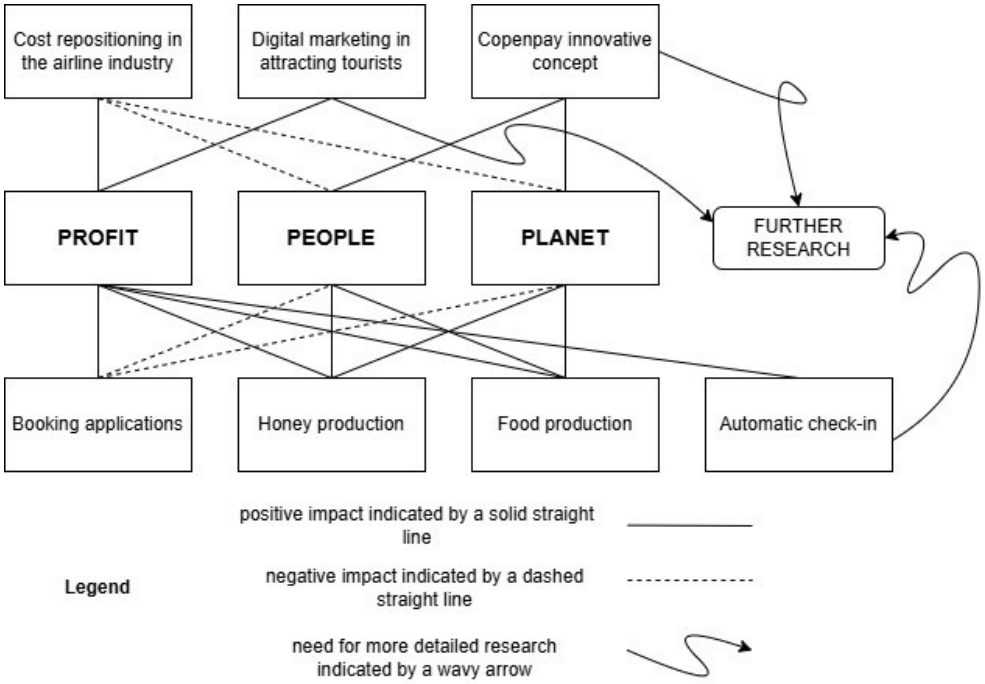
Source: Author's illustration, 2025.

Figure 2 shows how innovative cost repositioning in the airline industry and digital marketing and booking applications positively impact tourism growth. However, the examples also point to the subsequent negative effects that overtourism brings to local communities. Although digital marketing is classified as one of the factors that contribute to excessive tourism, when properly directed, it can be used for educational purposes, i.e., to change consumer habits (e.g., the example with a bottle of water and drinking tap water). On the other side of the figure, the Copenpay concept is shown first, which has the primary goal of promoting sustainable behavior in tourism. However, the figure lacks a clearer context for how such behavior affects the economic and sociological dimensions, which this study examines through the Triple Bottom Line. This is followed by bee breeding and food production on hotel rooftops, which represent innovative examples with a positive impact on all aspects of sustainability; specifically, they affect all dimensions of the triangle positively.

The heterogeneity of conclusions, i.e., the observations of positive and negative consequences of innovation in tourism, confirms the need for a rational choice of examples in this study, which not only illustrate different aspects of the problem but also offer potential solutions. Copenhagen stands out as an urban destination that balances promoting tourism with protecting residents' quality of life. However, for broader insights and a better understanding, it is necessary to synthesize several similar examples from different continents.

Figure 3

An overview of the notable impacts of innovation through the Triple Bottom Line concept



Source: Author's illustration, 2025.

Figure 3 presents an overview of the observed impacts of innovation through the Triple Bottom Line concept. Positive impacts are shown in a solid line according to the dimensions of the Triple Bottom Line. Negative impacts are shown with a dotted line, and a wavy arrow indicates applications of innovation that require more detailed research to determine impacts more reliably. Digital marketing has positive connotations for profit, but when you account for the negative consequences that affect people and the environment, additional research is needed to determine the impacts on people and the planet. Furthermore, Copenpay contributes positively to the people and planet dimensions. However, its economic dimension remains unclear: whether it generates profit, which also calls for more detailed insight and research, and potentially how the Copenpay concept could be made profitable if it is not. This is followed by booking applications, which definitely make a profit, but, considering the people and planet dimensions, they can lead to excessive tourism, which indirectly produces negative effects. Also, the ability to direct tourist flows spatially and temporally can help neutralize the negative effects on people and the planet. Automating the check-in process certainly contributes positively to earnings. However, to more accurately determine the impact on people and the planet, further research is needed, mainly because of the aforementioned social constraints, the inclusivity challenge, and the extent to which automated check-in truly enables better urban mobility. However, the sustainability of urban mobility also depends on renewable energy sources used in public transport.

Table 1

Presentation of the main impacts of innovations in tourism through the concept of the Triple Bottom Line

Example and aspect of the Triple Bottom Line concept	Earnings	People	Planet Earth
Cost Repositioning in the Airline Industry	It enables earnings and the availability of air transport. It enables the "proximity" of tourist destinations to spatially distant emitting or receptive tourist markets.	Problematic employment and social rights. Also, the positive impact of excessive tourism deteriorates residents' quality of life.	Negative environmental impacts from high greenhouse gas emissions from transport and from overtourism.
Digital marketing in the function of attracting tourists	It supports local economic growth and attracts tourists as consumers.	It can contribute to overtourism, which reduces quality of life in tourist destinations. However, it can have a positive impact because its educational function can reshape tourist behavior.	The consequences of overtourism negatively affect natural resources and their exploitation.
Copenpay – transforming tourism into a terrain for change	Insights into economic impacts are unavailable and difficult to assess.	Educating tourists and encouraging sustainable behavior.	Sustainable behavior reduces negative environmental impacts.
Booking applications	It provides a source of income for the renter and can make accommodation more affordable for the tourist.	The impact is negative because, without adequate regulations, it stimulates excessive tourism with negative consequences for residents' quality of life.	Excessive tourism causes environmental degradation and negative externalities that are later challenging to solve.
Hives and honey production at a hotel in Prague	No honey procurement costs and competitive advantage.	It enriches the experience and educates guests on	It promotes biodiversity, a bio-indicator of a healthy environment.

		innovative, sustainable practices.	
Growing food at the top of a hotel in Bangkok	Absence of food procurement costs and competitive advantage (differentiation of supply).	It provides a competitive advantage and a tangible way of implementing innovative and sustainable practices in the hotel.	It reduces the "food kilometers" and emissions needed to deliver food and reduces the impact of heat islands in cities. Circular economy – using food waste to produce new food.
Automated check-in system in a hotel in Antwerp	Economically eliminates the need for personnel and partially solves seasonal demand for staff.	The problem of inclusivity, digital literacy, and the availability of biometric documents. Reducing human contact may have a negative sociological impact, which can be desirable.	Questionable, but likely to impact urban mobility and the environment. To determine the persistence of the impact with certainty, consider the energy source used in transport.

Source: Author's compilation, 2025.

The results clearly indicate the complexity of the impact of innovation in tourism across three dimensions. While some innovations, such as urban food and honey production, contribute positively to all aspects of sustainability, others, such as digital marketing and booking applications, have two-way effects, driving tourism growth but causing subsequent negative social and environmental consequences. This heterogeneity highlights the need for careful management in specific contexts of innovation application.

Discussion

As the review notes, despite different regional manifestations of global tourism challenges, all contexts share a similar underlying conflict between the short-term economic benefits of tourism growth and the long-term sustainability of urban areas. Even when seasonal pressures are short-run, and profit is generated more efficiently through innovation, the consequences for people and the environment remain long-term (e.g., rising property prices, consequent gentrification and environmental pollution). Regional differences therefore do not point to a different nature of the problem, but to a different stage and speed at which individual regions develop regulatory and infrastructural responses to this conflict.

The results of the analysis of the examples indicate that Schumpeter's (1934) theory of creative destruction is realized in practice asymmetrically in relation to the three

dimensions of the Triple Bottom Line. Innovations successfully destroy inefficient business models and generate profits. However, this creative destruction does not automatically spill over to the people and planet dimensions; instead, it can further distort them through excessive tourism. Relying on Rogers' (2003) theory of diffusion of innovation, the spread of certain innovative models, such as cost repositioning in the airline industry or the use of booking platforms, points to the risk of spillovers not only of positive economic effects, but also of accompanying (uncontrolled) negative externalities. This suggests that the spread of an innovation that is not accompanied by adequate regulation increases the likelihood of replicating its negative social and environmental effects in (new) destinations — in contrast to initiatives such as Copenpay, which are already at the design stage directed towards all three dimensions of sustainability. Thus, the diffusion of innovation can amplify positive (economic) but also negative (social and environmental) effects, demonstrating innovation's dual role in tourism, emphasizing the need for conscious management rather than passive acceptance of technological determinism. Such a pattern of dynamics suggests that the creative destruction and diffusion of innovation alone are not sufficient to achieve balance within the Elkington triangle (Elkington, 1997). Therefore, regulation is needed to direct efforts toward all three dimensions, not just the economic one, confirming the need to integrate sustainability goals into innovation processes from the very beginning.

This is where regulation and local policies come to the fore. As highlighted in the methodology, the outcome of applying innovation largely depends on the human factor: the motives and ethics of the actors applying it. Booking applications and low-cost air transport illustrate this most directly. These are innovations that are not harmful themselves. However, the absence of their regulation (e.g., restrictions on short-term rentals, environmental taxes on air transport) allows their potential to be exhausted almost exclusively in the economic dimension, with accompanying negative effects for the local population and the environment (Camilleri, 2018; Dyck et al., 2023). By contrast, Copenpay shows how a targeted initiative, aimed at all three dimensions from the outset, can avoid this pattern – but at the cost that the economic viability of such a model remains uncertain. It should be added that the Copenpay initiative currently does not cover the entire tourism industry, but only those who actively participate in sustainable tourism, which indicates the extreme complexity of building sustainability in tourism.

In relation to the existing literature, which, according to Elkhwesky et al. (2024), remains largely limited to national and regional studies without a systematic global comparison, this study contributes by introducing such a comparison through a heterogeneous, geographically dispersed sample of examples. Thus, the results suggest that the negative consequences of innovation in tourism arise from unaddressed requirements across all dimensions of sustainability. This insight is not limited to one region, and the heterogeneity of examples indicates the prevalence of this phenomenon, providing a foothold for further research into the twin effects of innovation in tourism.

Limitations

The main limitation of the work stems from the very nature of the phenomenon under study. Given that the analyzed innovations are currently implemented in very heterogeneous contexts in tourism, the phenomenological insight is at the level of illustrative examples. At this stage, quantitative methods such as a survey would not provide depth, nor would they offer a phenomenological foothold sufficient to conduct high-quality empirical research. Future research should include public opinion surveys and examine the extent to which respondents agree that these or similar relationships work in a certain way. On the other hand, implementing the survey would require questions that are difficult to specify until the phenomenological mechanism behind the dual impact of innovation in tourism is accurately determined.

Despite the approach used, the main limitation of this research is its inability to accurately quantify the direct impact of specific innovative practices on all three dimensions of the Triple Bottom Line concept. Examples also suggest that innovation is mainly used to achieve economic goals, reducing focus on the remaining two dimensions of sustainability. Another important limitation is that this study did not analyze all types of impacts across the heterogeneous tourism value chain, especially when considering the sustainability of the entire tourism sector. More nuanced quantitative approaches can further clarify impacts and show how to manage them. In conclusion, the examples indicate that innovations can successfully and simultaneously address all three dimensions of sustainability and ultimately achieve the full aspect of sustainability in their definition.

Conclusion

The results suggest that innovation represents a capacity with insufficiently explored potential for sustainability development. Innovations, according to Schumpeter's theory of creative destruction, obviously serve to optimize economic goals; however, they only partially address the requirement of Elkington's triangle balance. The results indicate that innovation can initially drive unsustainable overtourism, but it can also be used to address sustainability challenges. The insights of this research offer valuable guidelines for cities and hoteliers in formulating their development strategies. Balancing the imperative of short-run profit with long-run sustainability requires not only regulatory interventions but also the use of specific fiscal policy tools. For example, environmental or tourism taxes can internalize negative externalities and mitigate the negative impacts of innovation. Since the research points to the positive impacts of innovation in addressing sustainability challenges, authorities could fiscally incentivize or subsidize innovations focused on socially desirable goals rather than exclusively maximizing profits (such as the Copenpay example). Furthermore, fostering city-to-city and international knowledge sharing, coupled with the cross-implementation of successful innovative practices, can help achieve higher levels of sustainability in urban

areas, boost local economies, and create more enjoyable urban hubs for residents and visitors.

So, innovations are used for economic performance, better visibility, and reputation, all of which reflect the economic implications of innovation in the context of tourism, as shown in the examples used in this study. Also, although innovation improves eco-efficiency, without regulation, implementing innovations can lead to overtourism and consequent negative implications for the local population and quality of life. Regulatory mechanisms, e.g., accommodation booking applications, can help shape the tourism sector and make it more sustainable. Specifically, innovation potential could be directed toward better meeting the needs of the local population, i.e., socioeconomic, social, and environmental requirements. The Danish example shows success: sustainable and responsible tourist behavior is rewarded at the micro-level, influencing tourists' behavior and changing habits. Platforms, for example, positively impact tourism development. However, tourism innovation should cover all dimensions of sustainability (i.e., the Elkington triangle) and all aspects of the heterogeneous value chain present in tourism. In fact, innovations that increase economic activity often ignore the environmental and sociological dimensions of sustainability, i.e., the elements that balance the Elkington triangle of the Triple Bottom Line.

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