



Adaptive Reuse of Industrial Heritage and Circular Tourism: An Impact Assessment Framework

Francesca Nocca^(✉) , Martina Bosone , Francesca Buglione ,
and Pasquale De Toro 

Department of Architecture, University of Naples Federico II, Toledo Street, 402, 80134 Naples,
Italy

francesca.nocca@unina.it

Abstract. The tourism industry is one of the fastest growing sectors, although it has been adversely affected in recent years by the COVID-19 pandemic. This growth led to increasing economic, socio-cultural and environmental impacts, both positive and negative. The tourism sector produces negative impacts, especially in environmental terms, as it is organised according to a linear logic. As already introduced by the United Nations in the Agenda 2030 and in the New Urban Agenda, the circular economy can represent a development model for a more sustainable future. This model can be adopted in various fields and sectors, including tourism, to transform processes from linear to circular. A strategy for implementing this circular logic is represented by adaptive reuse. This approach is very effective for the regeneration of abandoned and/or underused cultural heritage. The identification of a new function makes it possible to ‘keep alive’ the building, adapting it to the needs and requirements of the community, while preserving its historical, symbolic, cultural values. Moreover, adaptive reuse of cultural heritage makes it more ‘attractive’ for visitors and tourists. However, it is necessary that such tourism is organised and managed in a circular logic, namely it is a “circular tourism”, to avoid it becoming a threat to the integrity of the heritage itself or a producer of negative impacts (in environmental, economic and social terms) on the context. The present contribution proposes an evaluation framework, based on criteria and multidimensional indicators, to assess the “circularity” of tourism resulting from adaptive reuse of cultural heritage, with a particular focus on the industrial heritage characterised by particular historical and cultural values, for supporting the identification of sustainable development strategies.

Keywords: industrial heritage adaptive reuse · circular economy · circular tourism · multidimensional indicators

1 Introduction

The tourism sector contributes significantly to global GDP: according to the World Travel and Tourism Council (WTTC), in 2022 the travel and tourism sector contributed 7.6% to global GDP, with an increase of 22% compared to 2021. However, it poses a serious threat

to the balance of ecosystems and contributes significantly to global warming due to the large amount of emissions produced by tourism activities. In addition, it produces further negative impacts on the natural ecosystem including as soil erosion, pollution, discharges into the ocean, habitat loss, increased pressure on threatened and endangered species and increased vulnerability to forest fires. Tourism activities also have a significant impact on the urban environment and the local population, as they cause waste, noise and air pollution, and congestion in infrastructure and public areas (Nocca et al., 2023).

The tourism sector, therefore, produces both positive and negative impacts, especially in environmental terms, as it is organised according to a linear logic [Bosone and Nocca, 2022]. As already introduced by the United Nations (in Agenda 2030 and the New Urban Agenda) (United Nations, 2015; 2016), the circular economy can represent a development model for a more sustainable future (Ellen Mac Arthur Foundation, 2013). This model can be adopted in various fields and sectors, including tourism, to transform processes from linear to circular. This allows considering unused or underused existing resources as nutrients for new processes, in a circular logic that avoids wasting resources and gives them new life (Angrisano and Nocca, 2023).

A strategy for implementing this circular logic is represented by adaptive reuse (Douglas, 2002), a strategy capable of extending the use value of (abandoned or underused) buildings, in line with the principles of the circular economy, while preserving and respecting their other values. This approach is very effective for the conservation/regeneration of abandoned and/or underused cultural heritage. The identification of a new function makes it possible to ‘keep alive’ the building, adapting it to the needs and requirements of the community, while preserving its historical, symbolic, cultural values. In this perspective, cultural heritage becomes capable of activating new value production circuits.

Moreover, adaptive reuse of cultural heritage makes it more ‘attractive’ for visitors and tourists. However, it is necessary that such tourism is organised and managed in a circular logic, namely it is a “circular tourism” (Nocca and Fusco Girard, 2017), to avoid it becoming a threat to the integrity of the heritage itself or a producer of negative impacts (in environmental, economic and social terms) on the context.

This contribution is specifically focused on a particular cultural heritage, namely industrial heritage characterised by particular historical and cultural values. Through the strategy of adaptive reuse, abandoned industrial heritage can be regenerated and ‘given back’ to the community. In this way, the disused industrial heritage becomes more attractive, also for tourists.

The reuse of abandoned industrial heritage can reduce negative social and environmental externalities by stimulating responsible and sustainable cultural tourism that is attentive to local communities, the preservation of intangible values, the social and cultural carrying capacity of tourist destinations, the preservation of natural ecosystems and the diversification of tourist flows (Kuzior et al., 2021). This requires new policies and strategies to decouple the development of the tourism sector from the production of negative social and environmental impacts.

The present contribution proposes an evaluation framework, based on multidimensional criteria and indicators, to assess the “circularity” of tourism resulting from industrial heritage (characterised by particular historical and cultural values) adaptive reuse projects for supporting the identification of sustainable development strategies.

After a brief description of sustainable tourism and the circular economy (§2), the adaptive reuse of industrial heritage is introduced as an implementation strategy of the circular economy model able to develop a more sustainable tourism (§2.1). In Sect. 3, the importance of the assessment tools for evaluating adaptive reuse of industrial heritage is described, providing an overview of the existing scientific literature on this topic (§3). In Sect. 4, the multidimensional evaluation framework is proposed and discussed (§4). In Sect. 5 the strengths and limitations of the proposed approach are investigated (§5).

2 Tourism and the Circular Economy

The economy today is still based on mainly linear production and consumption models: take-make-use-dispose. Today’s linear economy does not optimise materials or promote their recycling, reuse or recovery, but depletes natural resources and generates waste. Therefore, the concept of circular economy is receiving increasing attention from policy makers and stakeholders worldwide, although mainly related to waste management. The tourism sector is today organised according to a linear logic, consuming enormous amount of energy and water, producing food waste, congestion problems and CO₂ emissions (Rodriguez, 2020). Therefore, it is necessary to reverse this trend: the circular economy can represent an efficient model to make tourism sector more sustainable (Nocca et al., 2023).

Circular tourism can be defined as “the tourism that transforms its processes from linear (take-make-dispose) to circular (take-make-use-remake) ones. [] It limits impacts on the environment, and in which actors of tourism (traveler, host, tour operator, supplier) adopt an eco-friendly and responsible approach” (Fusco Girard and Nocca, 2017). Circular tourism has the capacity to trigger and stimulate circular flows, aiming to conciliate the tourism sector and sustainable resource management (Nocca et al., 2023).

Most definitions of circular tourism are mainly related to the environmental field and thus to the eco-friendly approaches of each actor involved (Sgambati et al., 2021). By applying circular economy principles, tourism and hospitality operators can provide more sustainable experiences, adopting measures to save water and energy (especially from non-renewable sources), lower CO₂ emissions, waste reduction, even the provision of zero km food in restaurants (Van Rheede, 2012; Vargas-Sánchez, 2018). Recovery, reuse, redevelopment, but also valorisation and regeneration are keywords of the circular economy model that refer not only to material capital but also to knowledge and values, producing impacts also in the social and cultural dimensions. In this perspective, circular tourism represents a means capable of generating and regenerating values, maintaining them over time (Nocca & Fusco Girard, 2017).

2.1 The Adaptive Reuse of Industrial Heritage as a Strategy for Triggering of Circular Tourism

Starting from the end of XX century, due to the deindustrialisation processes, many industrial plants and whole urban areas have been abandoned, determining social, environmental and economic costs. Heritage regeneration, when considered from a circular perspective, can preserve derelict buildings and industrial sites without damaging their cultural and historical significance and meet new socio-economic needs (Alavi et al., 2022).

As also emphasised by The International Committee for the Conservation of the Industrial Heritage (TICCIH), one of the most appropriate strategies for the sustainable conservation of brownfield sites is the adaptive reuse (TICCIH, 2011). This strategy, in line with the principles of the circular economy, contributes to the achievement of the Sustainable Development Goals (Chen et al., 2016).

In recent years, the conversion of abandoned of industrial buildings has been implemented in many cities and regions around the world (such as the Ruhr in Germany, Montceau-les-Mines in France, or Coal-Brookdale in the UK) for the tourism development as a means for dealing with the economic, social and cultural crises resulting from the closure of industrial plants (Zhao & Liu, 2021). Industrial heritage tourism refers to the “development of tourism activities and industries on man-made sites, buildings, and landscapes that originated with industrial processes from earlier periods” (Edwards, J.; Llurdes, J. Mines and quarries: Industrial heritage tourism. *Ann. Tour. Res.* 1996, 23, 341–363; Zhao & Liu, 2021).

The European Industrial Heritage Route (ERIH), a pan-European network linking industrial sites and museums, was established to raise public awareness of the importance of the industrial heritage sector and to promote sustainable development practices in urban areas through collaboration and cooperation between these sites, stimulating local tourism (Yan et al., 2023).

However, post-industrial tourism development impacts both positively and negatively on the environmental and socio-economic dimensions. The transformation of ex-industrial sites into tourism-based industrial ones can produce not only the direct effects as high number of tourist arrivals, new job opportunities, but also indirect multiplier effects for the local community, as strengthening local identity and creating new investment opportunities (Zhao & Liu, 2021; Szromek et al., 2021).

The positive impacts of industrial heritage adaptive reuse are also significant in socio-cultural terms. The preservation and redevelopment of industrial heritage sites are efficient activities for transmitting historical and cultural values, knowledge of the traditional skills and production processes, industrial culture and improving spatial quality (Yan et al., 2023).

Furthermore, regeneration of ex-industrial sites can generate tourism revenue (Beşir & Karakök, 2023). In recent times, the popularity of industrial heritage tourism has grown as it provides educational and experiential opportunities for tourists (Wei & Zhang, 2023). However, tourism resource management in this field should not be limited to mere recreational contemplation, but it should also generate opportunities for innovation and progress (Somoza-Medina & Montserín-Abella, 2021).

Uncontrolled tourism in recent years caused an increasing pressure on urban systems. It needs to be organized and managed in a more sustainable way in order to reduce the pressure on the cities.

3 Evaluation Tools for Assessing the Tourism Associated to the Adaptive Reuse of Industrial Heritage

In the tourism sector, evaluation tools are fundamental in order to assess the efficiency and effectiveness of strategic decisions in a short- and long-term perspective. Evaluation from a circular economy perspective implies interpreting phenomena through a systemic perspective and adopting integrated approaches to consider multidimensional impacts and capture the complexity of values involved (Nocca et al. 2023; Nocca and Angrisano, 2022).

The adaptive reuse of industrial heritage is, in terms of evaluation, much investigated. However, the evaluation framework emerged from the scientific literature do not fully capture the aspects of ‘circular tourism’, remaining in a mostly linear perspective, e.g. indicators refer to the number of tourists, number of museums, accommodation facilities. These indicators give information about the increase in tourism without worrying about the possible negative impacts they may have, such as that related to the phenomenon of overtourism. Moreover, these indicators provide data neglecting the relationship with other fundamental aspects of tourism, linked to the intangible values of a place, such as its identity, its memory, its community.

Bottero et al., (2019) present an application of the Preference Ranking Organisation Method for the Enrichment of Valuations (PROMETHEE) to support the design and implementation of adaptive reuse strategies of abandoned industrial heritage in vulnerable contexts and assess its tangible and intangible effects. Beşir & Karakök, (2023) determine some parameters to ensure sustainable preservation in the adaptive reuse of industrial heritage and propose a decision-making model. Such a model can be used by planners and investors who wish to undertake the appropriate measures in the adaptive reuse of industrial heritage and assess the possible positive and negative impacts. In particular, much emphasis is placed on the conservation aspect. An and Zhao, (2021), based on the theory of sustainable tourism and heritage conservation, propose a system for assessing the suitability of industrial heritage tourism development that includes twenty indicators divided in five categories: heritage conservation, natural environment, social aspects, transport accessibility and tourism service facilities. However, although some studies dwell on the multidimensionality of impacts, the circularity of resources is not emphasised.

Zhao & Liu (2021) use the Evolutionary Economic Geography (EGG) approach to understand the development of industrial heritage tourism in Japan, focusing on the city of Kitakyushu as a case study. This case illustrates the importance of context conditions and stakeholder cooperation. The results of this study also showed that the participation of community residents and the application of new technologies, together with the strong support of national and local governments, are crucial for the promotion of post-industrial tourism development. Hwang & Chang (2018) propose a weighting system for the adaptive reuse of industrial heritage spaces by applying the AHP method. This

proposal identifies the indicators of suitability for the reuse of industrial heritage space, organized in four main criteria and twenty-two sub-criteria. The AHP method is used to obtain the relative weight of each indicator and the consistency check and analysis. Otgaar & Klijs (2010) study the benefits of industrial tourism and how they are distributed among stakeholders (public and private). This study discusses the various methods for assessing the economic impacts of tourism and their application to industrial tourism.

The analysis of the scientific literature reveals a strong lack of indicators capable of capturing the ‘circularity’ of certain phenomena, such as that related to tourism resulting from adaptive reuse of industrial heritage, for demonstrating the sustainability of strategic choices.

4 Industrial Heritage Adaptive Reuse and Circular Tourism: A Proposal for an Evaluation Framework

This research intends to propose a matrix of criteria and indicators to assess the impacts of tourism resulting from brownfield adaptive reuse projects in a circular perspective. This framework of indicators is intended to support the different tourism-related stakeholders (governments, tour operators, tourism enterprises, destination managers and marketing organisations, site management authorities, spatial planners, heritage and tourism professionals) in orienting strategic choices and monitoring their effectiveness in order to make tourism sector more sustainable.

Table 1 presents the matrix of criteria and indicators for measuring the “circularity” of the impacts produced by adaptive reuse of industrial heritage, in tourism terms. They have been deduced from the documents by World Tourism Organization of United Nations (UNWTO) on “Call for action for tourism’s COVID-19 mitigation and recovery” and Global Guidelines to Restart Tourism (UNWTO, 2020a; 2020b).

The indicators are divided in four categories corresponding to the four sustainability dimensions. For each dimension, different impact categories have been identified. The matrix shows the criterion, the indicator and its identification number, the unit of measurement, the source, and the function (min or max).

5 Discussions and Conclusions

The tourism sector produces both positive and negative impacts, especially in environmental terms. Introducing the concept of circular economy in tourism can be an effective strategy to make it more sustainable. Using the circular model in tourism means minimizing the negative externalities of this sector in environmental, socio-cultural and economic terms. The research has proposed an evaluation framework to assess the “circularity” of tourism resulting from adaptive reuse of industrial heritage.

Table 1. Proposed evaluation framework

Criteria	Indicators	Unit of measure	Max/Min
Environmental dimension			
1. Ecological footprint	1.1 Average carbon footprint of tourists travelling from home to destination	tonnes of CO2 equivalent	<i>min</i>
	1.2 Number of tourists using soft mobility (bicycles, electric vehicles) in the reused industrial area	% / year No. / year	<i>max</i>
	1.3 Number of tourists declaring choosing facilities with a recognised voluntary green certification	Yes / not	<i>max</i>
2. Crowding	2.1 Annual percentage of tourists visiting reused industrial heritage compared to residents	No. of tourists /tot.citizens /year	<i>min</i>
3. Waste management	3.1 Provision of recycling collection within the reused industrial area	Yes/No	<i>max</i>
	3.2 Amount of waste from recycling collection within the reused industrial area	Tons on the total	<i>max</i>
5. Energy efficiency	5.1 Percentage of energy consumed by the reused industrial area from renewable sources	% / year	<i>max</i>
	5.2 Percentage of tourists declaring to pay attention to cooling and heating consumption in the facilities of the reused industrial area	% / year	<i>max</i>
6. Water efficiency	6.1 Percentage of water consumed by reused industrial heritage from recycling water processes	% / year	<i>max</i>
	6.2 Amount of tourists declaring to pay attention to water system in the facilities of the reused industrial area	% / year	<i>max</i>

(continued)

Table 1. *(continued)*

Criteria	Indicators	Unit of measure	Max/Min
Social dimension			
7. Responsible behaviour of tourists	7.1 Amount of tourists in reused industrial area adopting respectful behaviours towards the host community	% / year	<i>max</i>
8. Loyalty	8.1 Percentage of visitors returning to the destination (within 5 years)	%	<i>max</i>
9. Digitisation	9.1 Amount of tourists using digital tools for learn about reused industrial heritage history	% / year No. / year	<i>max</i>
10. Community involvement	10.1 Amount of tourists involved in activities of local enterprises working in/for the reused industrial area	% / year No. / year	<i>max</i>
	10.2 Amount of tourists involved in activities with the local community in the reused industrial area	% / year No. / year	<i>max</i>
	10.3 Amount of tourists involved in activities related to the reused industrial area promoted by local community	% / year No. / year	<i>max</i>
	10.4 Amount of tourists who have hired local guides (on the total of tourists) about reused industrial area	% / year No. / year	<i>max</i>
11. Inclusiveness	11.1 Presence of tools and services to overcome language barriers (and thus allowing dialogue and social interaction)	Yes/not	<i>max</i>

(continued)

Table 1. (continued)

Criteria	Indicators	Unit of measure	Max/Min
Cultural dimension			
12. Cultural attractiveness	12.1 Centrality of the reused industrial heritage in the place branding strategies	Likert scale	<i>max</i>
	12.2 Percentage of visitors stay for cultural events	% / year	<i>max</i>
	12.3 Number of tourists declaring to visit the reused industrial area after deepening knowledge on the industrial heritage site through audio-visual product service	No. / year	<i>max</i>
13. Tourism experiences	13.1 Amount of tourists participating in local cultural activities that support the handing down of the industrial history of the site	No. / year	<i>max</i>
14. Preservation of tangible and intangible heritage	14.1 Spaces intended for the exhibition of objects and machinery related to the industrial tradition	sqm	<i>max</i>
	14.2 Percentage of residents satisfied with the impact of tourism on destination identity	% / year	<i>max</i>
Economic dimension			
15. Contribution to heritage preservation	15.1 Amount of donations from tourists for supporting design activities related to reuse of industrial heritage	€ / year	<i>max</i>
	15.2 Amount of donations from tourists for supporting dissemination activities related to reuse of industrial heritage	€ / year	<i>max</i>
16. Real estate	16.1 Real estate value of surrounding buildings following the adaptive reuse of industrial heritage	€/sqm	<i>max</i>
18. Local economy enhancement	18.1 Contribution of tourism related to reused industrial heritage to local economy	€ / year	<i>max</i>
	18.3 Number of jobs linked to reused industrial heritage	No	<i>max</i>

References

1. Alavi, P., Sobouti, H., Shahbazi, M.: Adaptive re-use of industrial heritage and its role in achieving local sustainability. *International Journal of Building Pathology and Adaptation*, Emerald Publishing Limited 2398–4708 (2022). <https://doi.org/10.1108/IJBPA-09-2021-0118>
2. An, Q., Zhao, Z.: Suitability assessment of industrial heritage tourism of the towns along Chinese Eastern Railway in Heilongjiang Province, 57th ISOCARP World Planning Congress 8–11 November, Doha, Qatar (2021). https://isocarp.org/app/uploads/2022/03/ISOCARP_2021_An_85.pdf
3. Angrisano M., Nocca F.: Urban Regeneration Strategies for Implementing the Circular City Model: The Key Role of the Community Engagement, *Lecture Notes in Computer Science book series (LNCS, volume 14108)*, pp 359–376 (2023)
4. Beşir, E.Ş., Çelebi Karakök, M.E.: Determination of conservation-reuse parameters for industrial heritage sustainability and a decision-making model proposal. *Sustainability* **15**, 6796 (2023). <https://doi.org/10.3390/su15086796>
5. Bosone, M., Nocca, F.: Human circular tourism as the tourism of tomorrow: the role of travellers in achieving a more sustainable and circular tourism. *Sustainability* **14**, 12218 (2022). <https://doi.org/10.3390/su141912218>
6. Bottero, M., D’Alpaos, C., Oppio, A.: Ranking of adaptive reuse strategies for abandoned industrial heritage in vulnerable contexts: a multiple criteria decision aiding approach. *Sustainability* **11**, 785 (2019). <https://doi.org/10.3390/su11030785>
7. Chen, J., Judd, B., Hawken, S.: Adaptive reuse of industrial heritage for cultural purposes in Beijing, Shanghai and Chongqing. *Struct. Surv.* **34**(4/5), 331–350 (2016). <https://doi.org/10.1108/SS-11-2015-0052>
8. Douglas, J.: *Building Adaptation*. Butterworth-Heinemann Publishing, London, UK (2002)
9. Ellen MacArthur Foundation: What is a circular economy? Available online: <https://ellenmacarthurfoundation.org/topics/circular-economy-introduction/overview>
10. Ertaş Beşir, Ş.; Çelebi Karakök, M.E.: Determination of conservation-reuse parameters for industrial heritage sustainability and a decision-making model proposal. *Sustainability* **15**, 6796 (2023). <https://doi.org/10.3390/su15086796>
11. European Commission: The European Tourism Indicator System ETIS toolkit for sustainable destination management (2016)
12. Fusco Girard, L., Nocca, F.: From linear to circular tourism. *Estimate* **70**, 51–74 (2017)
13. Hwang, S.H., Chang, Y.F.: The adaptive indicators and weighting system for the reuse of industrial heritage. *Journal of the Science of Design* (2018). Online ISSN: 2424-2217, ISSN-L: 2424-2217, https://doi.org/10.11247/jsd.2.2_2_111
14. Jelinčić, D.A.: Indicators for cultural and creative industries’ impact assessment on cultural heritage and tourism. *Sustainability* **13**, 7732 (2021). <https://doi.org/10.3390/su13147732>
15. Kuzior, A., Lyulyov, O., Pimonenko, T., Kwilinski, A., Krawczyk, D.: Post-industrial tourism as a driver of sustainable development. *Sustainability* **13**, 8145 (2021). <https://doi.org/10.3390/su13158145>
16. Miralles, C.C., et al.: The footprint of tourism: a review of water, carbon, and ecological footprint applications to the tourism sector. *J. Clean. Prod.* **422**, 138568 (2023). ISSN 0959-6526. <https://doi.org/10.1016/j.jclepro.2023.138568>
17. Nocca, F.: The role of cultural heritage in sustainable development: multidimensional indicators as decision-making tool. *Sustainability* **2017**, 9 (1882). <https://doi.org/10.3390/su9101882>
18. Nocca, F., Bosone, M., De Toro, P., Fusco Girard, L.: Towards the human circular tourism: recommendations, actions, and multidimensional indicators for the tourist category. *Sustainability* **15**, 1845 (2023). <https://doi.org/10.3390/su15031845>

19. Nocca, F.; Angrisano, M.: The Multidimensional Evaluation of Cultural Heritage Regeneration Projects: A Proposal for Integrating Level(s) Tool—The Case Study of Villa Vannucchi in San Giorgio a Cremano (Italy). *Land* **11**, 1568, (2022).
20. Nocca F., Angrisano M.: The Multidimensional evaluation of cultural heritage regeneration projects: a proposal for integrating level(s) tool. The Case Study of Villa Vannucchi in San Giorgio a Cremano (Italy) **11**(9), 1568 (2022). <https://doi.org/10.3390/land11091568>
21. Otgaar, A., Klijs, J.: How to measure the regional impact of industrial tourism (2010)
22. Rodríguez, C., Florido, C., Jacob, M.: Contributions of the circular economy to the tourism sector: a critical literature review. *Sustainability* **12**, 4338 (2020)
23. Sgambati, M., Acampora, A., Martucci, O., Lucchetti, M.C.: The integration of circular economy in the tourism industry: a framework for the implementation of circular hotels. In: Cobanoglu, C., Della Corte, V. (eds.) *Advances in Global Services and Retail Management*. University of South Florida M3 Center Publishing: Tampa, FL, USA, pp. 1–10 (2021). ISBN 978-1-955833-03-5
24. Somoza-Medina, X., Monteserín-Abella, O.: The sustainability of industrial heritage tourism far from the axes of economic development in Europe: two case studies. *Sustainability* **13**, 1077 (2021). <https://doi.org/10.3390/su13031077>
25. Suitability assessment of industrial heritage tourism of the towns along Chinese Eastern Railway in Heilongjiang Province, Qinglong AN, Zhiqing ZHAO, 57th ISOCARP World Planning Congress 8–11 November 2021 | Doha, Qatar. https://isocarp.org/app/uploads/2022/03/ISOCARP_2021_An_85.pdf
26. Szromek, A.R., Herman, K., Naramski, M.: Sustainable development of industrial heritage tourism: a case study of the Industrial Monument Road in Poland. *Tour. Gest.* **83**, 104252 (2021)
27. The adaptive indicators and weighting system for the reuse of industrial heritage shyh-huei hwang, Yi-Fen CHANG, 2018. *Journal of the Science of Design Online* ISSN: 2424-2217 ISSN-L : 2424-2217, https://doi.org/10.11247/jsd.2.2_2_111
28. The International Committee for the Conservation of the Industrial Heritage (TICCIH), Principles for the Conservation of Industrial Heritage Sites, Structures, Areas and Landscapes, Adopted by the 17th ICOMOS General Assembly on 28 November 2011, Dublin (2011).
29. UNWTO. Call for Action for Tourism's COVID-19 Mitigation and Recovery; UNWTO: Madrid, Spain (2020a).
30. UNWTO. Global Guidelines to Restart Tourism; UNWTO: Madrid, Spain (2020b)
31. United Nations: New urban agenda. In *Proceedings of the United Nations Conference on Housing and Sustainable Urban Development*, Quito, Ecuador, 17–20 October 2016
32. United Nations: Transforming our world: the 2030 Agenda for Sustainable Development ; Division for the Sustainable Development Goals: New York, NY, USA (2015). [Google Scholar]
33. Van Rheede, A.: Circular Economy as an Accelerator for Sustainable Experiences in the Hospitality and Tourism Industry. *Academia. Edu.* (2012). Available online: https://www.academia.edu/17064315/Circular_Economy_as_an_Accelerator_for_Sustainable_Experiences_in_the_Hospitality_and_Tourism_Industry
34. Vargas-Sánchez, A.: The inevitable disruption of the circular economy in tourism. *Hospitality World. Tour. Themes* **10**, 652–661 (2018)
35. Wei, C., Zhang, T.: Authenticity and quality of industrial heritage as the drivers of tourists' loyalty and environmentally responsible behaviour. *Sustainability* **15**, 8791 (2023). <https://doi.org/10.3390/su15118791>
36. World Travel and Tourism Council (WTTC): Economic Impact Research, available at: <https://wttc.com/research/economic-impact>
37. Yan, M., Li, Q., Zhang, J.: Rethinking industrial heritage tourism resources in the EU: a spatial perspective. *Land* **12**, 1510 (2023). <https://doi.org/10.3390/land12081510>

38. Zhao, Z., Liu, Z.: Development path of industrial heritage tourism: a case study of Kitakyushu (Japan). *Sustainability* **13**, 12099 (2021). <https://doi.org/10.3390/su132112099>
39. Zhu, J., Jiang, Y., Jiang, Y., Wang, Y., Yang, Q: The effectiveness of social elements in virtual reality tourism: a mental imagery perspective. *J. Hosp. Tour. Manag.* **56**, 135–146 (2023). ISSN 1447-6770, <https://doi.org/10.1016/j.jhtm.2023.05.024>