Creative Industries and Cultural Tourism: A Bibliometric Perspective on Art, Design, and Heritage Travel

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ABSTRACT

This study explores the evolving intersection between creative industries and cultural tourism through a comprehensive bibliometric analysis, with particular emphasis on themes such as art, design, and heritage travel. Drawing on publication data from the Scopus database between 2000 and 2025, the research employs VOSviewer to analyze keyword co-occurrence, author co-citation, and country collaboration networks. The findings reveal tourism as the central thematic hub, closely linked with concepts like sustainable development, creative economy, and innovation. Emerging keywords such as augmented reality, product design, and user experience suggest a growing scholarly interest in integrating digital technologies into cultural tourism experiences. Influential scholars including Richards, Florida, and Duxbury are identified as shaping the intellectual core of the field, while regional trends point to the increasing prominence of contributions from China, Indonesia, and other Southeast Asian nations. This study highlights the multidisciplinary nature of the discourse and identifies research gaps in technological innovation and cross-regional collaboration. It concludes by emphasizing the potential of creative industries to drive sustainable and participatory tourism development in the post-pandemic era.

Keywords: Creative Industries, Cultural Tourism, Heritage Travel, Product Design, Bibliometric Analysis

1. INTRODUCTION

In the last two decades, the global economy has witnessed a remarkable transformation shaped by the rise of the creative industries. These sectors, which encompass art, design, media, and cultural heritage, have increasingly become drivers of innovation, identity, and economic development. According to [1], creative industries not only contribute significantly to GDP and employment but also foster cultural diversity and social inclusion. As globalization accelerates and digital technologies permeate every facet of life, the boundaries between commerce and culture have become more porous. This phenomenon has opened up new opportunities for synergies between creativity and tourism, particularly in destinations seeking to position themselves beyond traditional sun-and-sea models [2].

Cultural tourism, as a sub-sector of the broader tourism industry, has been gaining momentum as travelers pursue more meaningful and experience-rich journeys. Rather than simply consuming attractions, tourists now seek immersive encounters with local arts, traditions, architecture, and creative expressions. As [3] points out, cultural tourism has evolved into a dynamic field where local identity, creativity, and visitor experience converge. From street art tours in Berlin to heritage fashion markets in Yogyakarta, the blend of creative outputs with touristic appeal has become a powerful catalyst for sustainable place-making. This shift reflects not only changing tourist motivations but also the strategic alignment of cultural assets with economic regeneration efforts by cities and regions [4], [5].

The intersection between creative industries and cultural tourism is particularly relevant in the post-industrial context where cities repurpose their historical infrastructure into vibrant cultural quarters. Former warehouses become contemporary art galleries, and old towns are rebranded as design districts. [6] has recognized the role of creative industries in enhancing the attractiveness of urban destinations and fostering inclusive growth. Notably, the development of cultural routes, art biennales, and heritage trails showcases how curated cultural narratives can attract both domestic and international tourists. These hybrid spaces of consumption and creativity require careful policy design, stakeholder collaboration, and innovation-driven planning.

Furthermore, the digital turn has radically reshaped how cultural content is produced, accessed, and experienced by tourists. Digital storytelling, augmented reality in heritage sites, and online cultural platforms have emerged as tools for enhancing visitor engagement. As highlighted by [7], digital technologies can help bridge the gap between cultural producers and audiences, making heritage more accessible and interactive. This technological mediation not only complements physical travel but also creates new cultural imaginaries that inspire tourism flows. In parallel, the COVID-19 pandemic underscored the vulnerability of tourism sectors while accelerating the need for digital resilience and cultural innovation [8].

Despite the growing interest in the creative tourism nexus, scholarly literature on the topic remains fragmented. Research is often dispersed across domains such as urban studies, cultural policy, design thinking, and tourism management. There is a pressing need to consolidate existing knowledge and understand how academic discourse has evolved over time. A bibliometric perspective provides a useful methodological lens to trace the development of this interdisciplinary field, identify influential scholars and institutions, and uncover thematic trends that shape future research. Prior studies have employed bibliometrics to map tourism innovation [9], but few have focused explicitly on the creative-cultural interface in tourism contexts.

While creative industries and cultural tourism are often discussed in tandem in policy and practice, there is a lack of integrated academic synthesis that captures their scholarly evolution. The absence of a consolidated knowledge map leads to missed opportunities for theoretical advancement and practical alignment. Current studies are mostly localized or thematic, without offering a global perspective on how research in art, design, and heritage tourism has converged. This fragmentation limits the potential for comparative studies, cross-sectoral learning, and coordinated development strategies that could enrich both tourism and creative sectors. This study aims to conduct a bibliometric analysis of scholarly publications at the intersection of creative industries and cultural tourism, with a specific focus on art, design, and heritage travel.

2. METHODS

This study employs a bibliometric analysis approach to map the intellectual landscape and research trends at the intersection of creative industries and cultural tourism, with a focus on art, design, and heritage travel. Bibliometric analysis is a quantitative method used to evaluate the structure, development, and dynamics of scientific literature through citation, co-citation, co-authorship, and keyword analyses. By revealing the most influential works, authors, journals, and thematic clusters, this method is suitable for understanding how the interdisciplinary field has evolved over time [10]. The rationale for choosing a bibliometric approach is to offer an objective and replicable mapping of research production, which can inform both academic inquiry and policy design in the cultural and tourism sectors.

Data for this study were collected from the Scopus database, recognized for its comprehensive coverage of high-quality peer-reviewed publications. The search strategy included a combination of keywords such as "creative industries," "cultural tourism," "heritage tourism," "art tourism," "design travel," and "creative tourism." Boolean operators (AND, OR) were used to refine the

search and ensure relevance to the research focus. The time frame of the search was set from 2000 to 2025 to capture both early foundational literature and more recent developments, particularly those influenced by digital transformation and post-pandemic recovery in tourism. Only journal articles and reviews written in English were included, and duplicate records or unrelated entries were excluded through a manual screening process.

Following data retrieval, the bibliometric analysis was performed using VOSviewer, a widely-used software tool for visualizing bibliometric networks such as co-authorship, co-occurrence of keywords, and citation patterns. The software enabled the identification of research clusters and intellectual structures through network maps and density visualizations. To enhance interpretability, the thematic evolution of research was examined using keyword co-occurrence and overlay visualization, offering insights into how topics such as "creative cities," "cultural heritage," and "experiential tourism" have emerged and interacted over time.

3. RESULTS AND DISCUSSION

3.1 Network Visualization

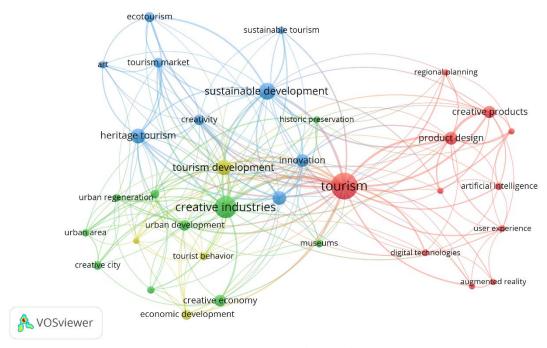


Figure 1. Network Visualization Source: Data Analysis Result, 2025

Figure 1 reveals a bibliometric network of co-occurring keywords related to creative industries and cultural tourism, emphasizing thematic clusters and their interconnections. This network map is structured around several prominent nodes that represent frequently occurring concepts within the literature, connected by lines whose thickness indicates the strength of their co-occurrence. The color-coded clusters highlight distinct yet interrelated research themes that have emerged in this interdisciplinary field, offering valuable insights into how creative industries intersect with tourism, heritage, and technological innovation. At the center of the visualization lies the keyword "tourism", depicted in bold red and occupying the largest node size, signifying its central role and high frequency across the analyzed publications. This node is interconnected with a wide array of terms from various clusters, indicating tourism's integrative nature in discussions that range from heritage preservation to product design. The red cluster, which branches out from "tourism," groups concepts such as "creative products," "product design," "augmented reality," "user experience," and "artificial intelligence". This suggests an emerging focus on technology-enhanced

tourism experiences, where digital and creative design tools are used to enrich cultural consumption, aligning with recent studies on smart tourism and immersive design (Neuhofer et al., 2015).

The green cluster, located to the bottom left of the map, is anchored around the concept of "creative industries", and includes closely linked terms like "creative economy," "tourist behavior," "urban development," "economic development," and "creative city." This cluster reflects an urban and policy-oriented discourse that emphasizes the role of creative sectors in regenerating local economies and enhancing city branding for tourism purposes. The presence of terms like "urban regeneration" and "urban area" supports the idea that cities are leveraging creative capital to foster economic revitalization and cultural tourism. The interlinkages with "tourism development" and "economic development" further reinforce the dual economic and cultural value of creative industries in tourism strategies.

To the top-left side of the visualization, the blue cluster centers around "sustainable development," "heritage tourism," "ecotourism," and "art." This indicates a thematic emphasis on sustainability, conservation, and cultural heritage, where the tourism experience is deeply rooted in authenticity, preservation, and environmental consciousness. The presence of "historic preservation" and "tourism market" within this cluster suggests scholarly attention on balancing tourist demands with the need to protect cultural and natural assets. Such trends resonate with the literature advocating for responsible tourism models, where cultural integrity and ecological balance are core priorities (Timothy & Boyd, 2003). The convergence of clusters around shared keywords like "innovation," "museums," and "creativity" reflects the interdisciplinary bridges that connect various research domains. The term "innovation" acts as a cross-cutting theme that links technological, urban, and sustainable perspectives. Its placement near the center indicates its integrative function across domains, signifying that innovation—be it in policy, design, or digital engagement—is a key driver in the evolving relationship between tourism and the creative economy.

3.2 Overlay Visualization

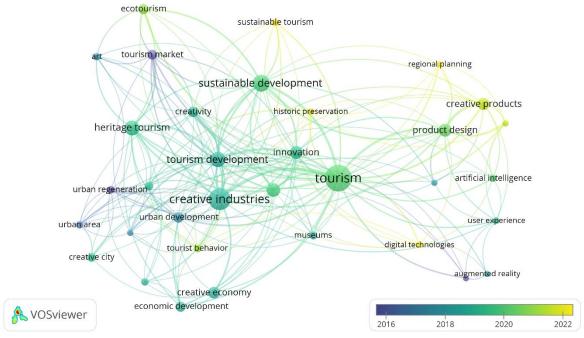


Figure 2. Overlay Visualization Source: Data Analysis Result, 2025

This figure illustrates the temporal evolution of keywords in scholarly literature related to creative industries and cultural tourism. The color gradient (from blue (older research, ~2016) to yellow (newer research, ~2022)) represents the average publication year of documents associated with each term. Central nodes like "tourism," "creative industries," "sustainable development," and "tourism development" appear in green, indicating that these concepts have remained consistently relevant over time, bridging earlier foundational studies with more recent academic discussions. Notably, the yellow-toned nodes, such as "creative products," "product design," "regional planning," and "sustainable tourism", signal emerging and contemporary research interests, gaining prominence especially after 2020. These newer themes suggest a growing academic attention on integrating creativity, design thinking, and regional policy frameworks into sustainable tourism models. Their location at the periphery of the network further implies that while they are still developing in terms of citation centrality, they represent cutting-edge topics poised to shape future research in the field. The shift toward design-oriented approaches and sustainability reflects broader societal concerns regarding responsible consumption and innovation-driven destination management post-COVID-19. Conversely, blue and purple nodes such as "urban regeneration," "creative city," "tourism market," and "augmented reality" represent earlier waves of scholarly focus, typically concentrated around 2016–2018. These terms were instrumental in initial discussions linking creative sectors with urban branding and technological enhancement in tourism. However, their relatively older timestamp suggests they may now serve as foundational themes that newer research builds upon or reinterprets through contemporary lenses like digital storytelling, user experience, or sustainability imperatives

3.3 Citation Analysis

Table 1. The Most Impactful Literatures

Citations	Authors and year	Title
659	[11]	Creativity and tourism. The state of the art
400	[12]	The economics of cultural policy
251	[13]	Designing creative places: The role of creative tourism
240	[14]	Creativity and tourism in the city
182	[15]	Tourism, creativity and development
166	[16]	Geographies of displacement in the creative city: The case of Liberty Village, Toronto
156	[17]	The smart city as a common place for tourists and residents: A structural analysis of the determinants of urban attractiveness
147	[18]	Examining social capital, organizational learning and knowledge transfer in cultural and creative industries of practice
126	[19]	Middle-earth meets New Zealand: Authenticity and location in the making of the lord of the rings
119	[20]	The worldmaking prodigy of tourism: The reach and power of tourism in the dynamics of change and transformation

Source: Scopus, 2025

3.4 Density Visualization sustainable tourism tourism market regional planning sustainable development creative products historic preservation creativity heritage tourism product design tourism development tourism artificial intelligence urban regeneration creative industries urban development urban area digital technologies tourist behavior creative city creative economy economic development VOSviewer

Figure 3. Density Visualization Source: Data Analysis Result, 2025

Figure 3 highlights the frequency and intensity of research focus in the field of creative industries and cultural tourism. The yellow to green color gradient represents the density of keyword occurrences, yellow areas indicate high-frequency topics that have been extensively discussed in the literature, while green and blue areas represent moderate to low-density topics. At the core of this visualization, the term "tourism" shines as the most dominant keyword, surrounded closely by other high-density terms like "creative industries," "tourism development," and "sustainable development." These terms form the intellectual core of the research landscape, indicating a long-standing and highly active scholarly conversation that integrates tourism with creativity, sustainability, and innovation. On the periphery, keywords such as "augmented reality," "user experience," "digital technologies," "artificial intelligence," and "regional planning" show up with lighter density, suggesting these are emerging or niche topics within the broader discourse. Their presence, albeit less intense, points to growing interest in integrating digital design and advanced technologies into the tourism and cultural experience. Similarly, terms like "creative economy," "urban regeneration," and "heritage tourism" appear in less saturated zones, indicating they may serve as supporting themes or contextual frameworks for the central discourse.

3.5 Co-Authorship Network

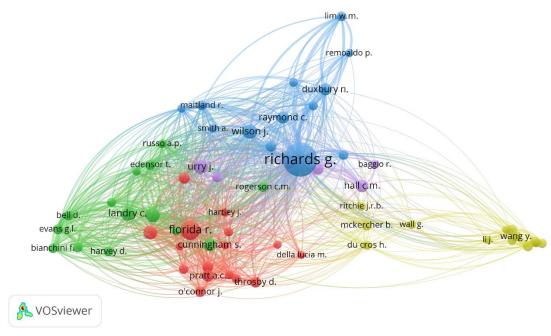
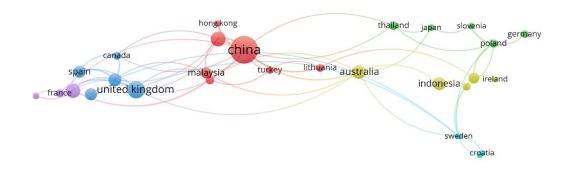


Figure 4. Author Visualization Source: Data Analysis Result, 2025

This fourth figure reveals the intellectual structure of research on creative industries and cultural tourism by highlighting the most frequently cited scholars and their collaborative or thematic proximities. At the center of the map, Richards G. stands out as the most influential and frequently co-cited author, signifying his foundational contributions to the field, especially in linking creativity and cultural tourism. Surrounding him are clusters of other prominent scholars forming distinct knowledge communities. The blue cluster includes authors such as Duxbury N., Raymond C., and Lim W.M., who are often associated with research on cultural planning and creative placemaking. The green cluster, featuring figures like Landry C., Evans G.L., and Russo A.P., reflects a strong urban-cultural policy orientation. The red cluster, anchored by Florida R. and Cunningham S., is centered on the creative economy, innovation, and cultural industries. On the right, a yellow cluster including Wang Y. and Li J. appears more recent or emerging, often associated with tourism analytics and destination studies.



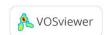


Figure 5. Country Visualization Source: Data Analysis Result, 2025

This figure 5 illustrates the global distribution and interconnectivity of scholarly contributions in the field of creative industries and cultural tourism. China emerges as the most dominant and interconnected country, acting as a major hub with strong collaborative links to Malaysia, Hong Kong, Turkey, Australia, and the United Kingdom. The United Kingdom, while slightly less central, also forms a robust cluster with Canada, Spain, and France, reflecting its foundational role in cultural policy and creative economy research. On the right side of the network, Indonesia stands out as a key player in the Southeast Asian region, with links to Sweden, Ireland, and Poland, suggesting growing regional involvement and cross-national partnerships. The presence of distinct color-coded clusters indicates regional research communities, such as Europe, East Asia, and Oceania, yet the lines connecting them highlight increasing international collaboration. This map underscores the globalized and interdisciplinary nature of research in this domain, while also pointing to emerging voices from countries like Indonesia, Thailand, and Croatia, signaling the expanding reach and diversification of the field.

Discussion

The findings of this bibliometric analysis offer valuable insights into the scholarly development of the intersection between creative industries and cultural tourism, especially in domains such as art, design, and heritage travel. The visualizations generated through VOSviewer reveal a richly interconnected, interdisciplinary field, yet one that is also fragmented along thematic, geographic, and methodological lines. Through the lens of keyword co-occurrence, author cocitation, and country collaboration networks, we gain a clearer understanding of how the academic discourse has evolved, where intellectual influences are concentrated, and how regional research strengths are being shaped.

The keyword co-occurrence map shows that "tourism" is the most central and dominant term, indicating its role as the conceptual core around which various subfields are organized. Its frequent association with keywords like "creative industries," "sustainable development," "tourism development," and "innovation" suggests that much of the research focuses on the contribution of creative and cultural strategies to destination management and development. This aligns with the

broader theoretical shift in tourism studies, which has moved from seeing tourism merely as a consumptive activity to recognizing it as a driver of cultural, economic, and urban transformation [15], [21].

Interestingly, several newer terms such as "creative products," "product design," and "user experience" appear more peripherally yet are visually connected to the core clusters. This suggests an emerging scholarly interest in the role of design and digital innovation in enhancing cultural tourism experiences. The integration of augmented reality, artificial intelligence, and digital technologies reflects how technological mediation is increasingly shaping tourist encounters with heritage, art, and culture—supporting previous findings by [22] on smart tourism experiences. However, the peripheral placement of these keywords also indicates that such themes are still in development, offering fertile ground for future interdisciplinary research that bridges tourism, human-computer interaction, and creative production.

The overlay visualization based on publication year further highlights temporal shifts in scholarly focus. Earlier research (2016–2018), represented by blue to green shades, centers around keywords like "creative city," "urban regeneration," "heritage tourism," and "urban development." These topics echo post-industrial strategies that position creative and cultural assets as tools for urban revitalization, as argued by Landry (2000) and Florida (2002). In contrast, more recent studies (2019–2022), indicated in yellow, gravitate toward "sustainable tourism," "creative products," and "regional planning," reflecting how the field is now engaging with pressing global concerns such as environmental sustainability, community-based development, and resilience—especially in a post-pandemic context.

The density map underscores which themes dominate the research landscape in terms of frequency. Unsurprisingly, "tourism" and "creative industries" are among the most saturated, followed closely by "sustainable development" and "tourism development." These findings affirm the view that the intersection of tourism and creative sectors is not merely a niche interest but a core area of scholarly inquiry, spanning economics, policy, and place-making. However, less intense areas such as "digital technologies," "artificial intelligence," and "user experience" suggest that these rapidly growing technological components have yet to receive theoretical and empirical depth within tourism and cultural studies. Encouraging future work in these areas may help bridge the gap between creativity and technological innovation in cultural consumption.

The author co-citation network reveals the intellectual genealogy of the field. Greg Richards is prominently placed at the center of the map, reaffirming his foundational role in establishing the concept of creative tourism and advocating for the importance of cultural experiences in travel motivations [23]. The proximity of scholars like Duxbury, Urry, Florida, and Landry further reinforces the interdisciplinary nature of the field, blending perspectives from cultural geography, creative economy, and urban studies. Interestingly, emerging contributors from Asia, such as Wang Y. and Li J., form their own cluster, pointing to a growing body of work originating from the Chinese academic context—often focused on large-scale tourism analytics, digital platforms, and smart city planning [24]. This suggests an East-West divide in terms of research themes, with Western scholarship emphasizing creativity, culture, and heritage, and Eastern research focusing more on technology, analytics, and infrastructural development.

Further diversity is revealed in the country collaboration network, which shows strong international cooperation led by China, the United Kingdom, and Australia. China's dominant presence in the network—both in terms of size and connections—signals its growing academic leadership in tourism research, likely driven by its investment in smart tourism infrastructure and its emphasis on culture-led development. Meanwhile, the United Kingdom's well-connected node indicates its long-standing contributions to cultural policy, creative cities, and urban heritage. Countries like Indonesia, Sweden, and Germany form smaller yet meaningful sub-clusters, reflecting a more localized and context-specific engagement with creative tourism, often tied to sustainability, intangible heritage, and community empowerment.

These visual patterns carry important implications for future research. First, there is a clear opportunity to foster more cross-regional collaboration, especially between emerging Southeast Asian scholars and established European research hubs. Indonesia, for example, could benefit from aligning its rich heritage and culinary tourism with creative economy strategies informed by global best practices. Second, the field would greatly benefit from greater methodological diversification. While bibliometric studies offer structural overviews, they should be complemented with qualitative case studies, ethnographies, and participatory research to unpack the lived experiences behind the keywords. Additionally, more critical perspectives are needed to address power dynamics in cultural tourism, such as gentrification, cultural appropriation, and the commercialization of heritage.

CONCLUSION

Based on the bibliometric analysis conducted in this study, it is evident that the intersection of creative industries and cultural tourism has evolved into a dynamic and interdisciplinary research domain, marked by strong conceptual anchors such as *tourism development*, *creative industries*, and *sustainable development*. The analysis reveals that while foundational themes related to cultural policy, urban regeneration, and heritage tourism continue to dominate, emerging areas such as digital technologies, product design, and user experience are gaining traction—signaling a shift toward innovation-driven and experience-based tourism models. The intellectual structure of the field is shaped by influential scholars like Richards, Florida, and Duxbury, whose works bridge urban studies, cultural theory, and tourism management. Additionally, the increasing participation of countries like China and Indonesia highlights the global expansion and diversification of research contributions.

REFERENCES

- [1] C. Stipanović, E. Rudan, and V. Zubović, "Cultural and Creative industries in Urban Tourism innovation—The example of the City of Rijeka," *Tour. South East Eur.*, vol. 5, pp. 655–666, 2019.
- [2] P. Long and N. Morpeth, "Tourism and the creative industries," London: Routledge. https://doi. org/10, vol. 4324, p. 9781315735870, 2016.
- [3] M. Al-Ababneh, "Creative cultural tourism as a new model for cultural tourism," J. Tour. Manag. Res., vol. 6, no. 2, pp. 109–118, 2019.
- [4] V. Gordin and M. Matetskaya, "Culture and local development: the interaction of cultural heritage and creative industries," Santalka Filos. Komun., vol. 19, no. 2, pp. 47–59, 2011.
- [5] D. A. Jelinčić, "Indicators for cultural and creative industries' impact assessment on cultural heritage and tourism," Sustainability, vol. 13, no. 14, p. 7732, 2021.
- [6] C. H. Henriques and S. R. Elias, "Interconnections between the cultural and creative industries and tourism: challenges in four Ibero-American capital cities," *Int. J. Cult. Tour. Hosp. Res.*, vol. 16, no. 1, pp. 337–351, 2022.
- [7] J. Virginija, "Interaction between cultural/creative tourism and tourism/cultural heritage industries," *Tour. Empir. Res. Towar. Pract. Appl. InTech, Croat.*, pp. 137–156, 2016.
- [8] D. Hesmondhalgh, "Cultural and creative industries," SAGE Handb. Cult. Anal., pp. 552–569, 2008.
- [9] M. Pourzakarya, "Searching for possible potentials of cultural and creative industries in rural tourism development; a case of Rudkhan Castle rural areas," *Consum. Behav. Tour. Hosp.*, vol. 17, no. 2, pp. 180–196, 2022.
- [10] N. Donthu, S. Kumar, D. Mukherjee, N. Pandey, and W. M. Lim, "How to conduct a bibliometric analysis: An overview and guidelines," *J. Bus. Res.*, vol. 133, pp. 285–296, 2021.
- [11] G. Richards, "Creativity and tourism: The state of the art," Ann. Tour. Res., vol. 38, no. 4, pp. 1225–1253, 2011.
- [12] D. Throsby, *The economics of cultural policy*. Cambridge university press, 2010.
- [13] G. Richards, "Designing creative places: The role of creative tourism," Ann. Tour. Res., vol. 85, p. 102922, 2020.
- [14] G. Richards, "Creativity and tourism in the city," Curr. issues Tour., vol. 17, no. 2, pp. 119–144, 2014.
- [15] C.-S. Ooi, "Creative industries and tourism in Singapore," in *Tourism, creativity and development*, Routledge, 2007, pp. 262–274.
- [16] J. P. Catungal, D. Leslie, and Y. Hii, "Geographies of displacement in the creative city: The case of Liberty Village, Toronto," *Urban Stud.*, vol. 46, no. 5–6, pp. 1095–1114, 2009.
- [17] J. Romão, K. Kourtit, B. Neuts, and P. Nijkamp, "The smart city as a common place for tourists and residents: A structural analysis of the determinants of urban attractiveness," *Cities*, vol. 78, pp. 67–75, 2018.
- [18] C.-H. S. Liu, "Examining social capital, organizational learning and knowledge transfer in cultural and creative industries of practice," *Tour. Manag.*, vol. 64, pp. 258–270, 2018.

- [19] D. Jones and K. Smith, "Middle-earth meets New Zealand: Authenticity and location in the making of The Lord of the Rings," J. Manag. Stud., vol. 42, no. 5, pp. 923–945, 2005.
- [20] K. Hollinshead, "The 'worldmaking' prodigy of tourism: The reach and power of tourism in the dynamics of change and transformation," *Tour. Anal.*, vol. 14, no. 1, pp. 139–152, 2009.
- [21] G. Waitt and C. Gibson, "Tourism and creative economies," Wiley Blackwell companion to Tour., pp. 230–239, 2014.
- [22] C. M. Rogerson, "Creative industries and urban tourism: South African perspectives," in *Urban Tourism in the Developing World*, Routledge, 2017, pp. 167–184.
- [23] G. Richards, "Creative tourism and cultural events," URL https://www. Acad. edu/5352995/creative-Tourism_and_Cultural_Events, 2010.
- [24] G. Azizova and A. A. Huseyn, "Evaluation the impact of the development of culture and creative industries on the tourism sector," *Econ. Soc. Dev. B. Proc.*, pp. 696–704, 2021.