

The Evolution of Digital Ecosystems in Tourism under Emerging Technologies and Platform Discourse Dynamics

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Research Article

Keywords: digital platform ecosystems, smart tourism, artificial intelligence, generative AI, platform governance, immersive technologies, sustainability, tourism ecosystems, bibliometric analysis, Booking.com

Posted Date: May 26th, 2026

DOI: <https://doi.org/10.21203/rs.3.rs-9807912/v1>

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Additional Declarations: The authors declare no competing interests.

Abstract

This study investigates the longitudinal evolution of digital platform ecosystems in tourism in the context of rapid advances in artificial intelligence, immersive technologies, and data-driven platform orchestration. Using a bibliometric analysis of 447 Web of Science-indexed publications published between 2015 and 2026, combined with an exploratory discourse analysis of Booking.com corporate communications, the study examines the thematic transformation of smart tourism research across three temporal phases: digital infrastructure ecosystems (2015–2019), adaptive platform coordination systems (2020–2022), and AI-driven intelligent tourism ecosystems (2023–2026). The findings reveal a progressive shift from infrastructure-oriented digitalization toward increasingly intelligent and interconnected tourism ecosystems integrating AI-enabled personalization, conversational interaction, immersive experiences, governance coordination, sustainability management, and predictive analytics. The results further demonstrate the growing convergence between academic smart tourism research and platform-level strategic discourse, particularly regarding generative AI, ecosystem orchestration, adaptive governance, and sustainability-oriented coordination mechanisms. The study contributes to the emerging literature on digital platform ecosystems by proposing a longitudinal conceptual interpretation of tourism platform evolution and by demonstrating how tourism platforms increasingly operate as intelligent so-cio-technical orchestrators rather than transactional intermediaries. The findings provide theoretical and managerial implications for researchers, tourism organizations, and digital platform stakeholders navigating the next generation of AI-driven tourism ecosystems.

1. Introduction

The rapid expansion of artificial intelligence (AI), big data analytics, blockchain, IoT, immersive technologies, and platform-based digital infrastructures is reshaping tourism ecosystems and the ways in which digital platforms coordinate interactions among travellers, destinations, accommodation providers, mobility services, and intermediaries [1–4]. Accordingly, smart tourism research has evolved from infrastructure-oriented digitalization toward AI-enabled platform ecosystems characterized by adaptive interaction, predictive analytics, immersive experiences, and governance-oriented coordination [5, 6].

Recent studies increasingly conceptualize tourism platforms as ecosystem orchestrators rather than transactional intermediaries, emphasizing the role of generative AI, conversational agents, metaverse tourism, blockchain-enabled trust systems, interoperability, stakeholder coordination, and sustainability management in shaping tourism experiences, destination governance, and digital business models [7–10].

Despite this expansion, existing research remains fragmented across smart tourism, hospitality technologies, tourism digitalization, AI adoption, and platform economy research. Previous bibliometric studies have mostly examined smart tourism technologies or AI applications separately, while limited attention has been devoted to the longitudinal evolution of digital platform ecosystems in tourism and to

the con-vergence between AI-enabled personalization, immersive experiences, platform governance, and sustainability-oriented coordination [5, 9, 11, 12]. In addition, recent re-search calls for stronger integration between AI, big data, governance, resilience, interoperability, and digital trust perspectives within smart tourism ecosystems [4, 13, 14].

A further limitation concerns the weak connection between academic knowledge production and platform-level strategic practice. Although recent studies emphasize AI-driven ecosystems, intelligent tourism infrastructures, and adaptive governance, limited research examines whether these technological paradigms are reflected in the strategic discourse of major tourism platforms [10, 15].

To address these gaps, this study investigates the evolution of digital platform ecosystems in tourism through a longitudinal bibliometric analysis combined with an exploratory platform discourse analysis. Using Web of Science-indexed publications from 2015 to 2026, the study examines research on digital platforms, smart tourism ecosystems, AI-driven technologies, immersive tourism, and platform governance across three periods: 2015–2019, 2020–2022, and 2023–2026. The analysis is complemented by Booking.com corporate communications published between 2023 and 2026, used to explore whether the technological and governance-related transformations identified in academic research are also reflected in platform-level strategic discourse.

The study pursues four objectives: to identify the longitudinal evolution and thematic transformation of digital platform ecosystem research in tourism between 2015 and 2026 (O1); to map the conceptual structure of the field through keyword co-occurrence and thematic cluster analysis, with emphasis on the convergence between AI, immersive technologies, governance, personalization, and sustainability-oriented tourism ecosystems (O2); to examine how tourism platforms are reframed as intelligent ecosystem-based coordination mechanisms characterized by predictive analytics, adaptive interaction, and digitally mediated customer engagement (O3); and to explore whether these emerging academic themes are reflected in Booking.com corporate communications during 2023–2026 (O4).

The remainder of the article is organized as follows. Section 2 reviews the literature on digital platform ecosystems, smart tourism, and emerging technologies in tourism. Section 3 presents the research methodology and bibliometric procedures. Section 4 reports the bibliometric findings and exploratory platform discourse analysis. Section 5 discusses the theoretical and managerial implications, limitations, and future research directions

2. Literature Review

2.1 Digital platform ecosystems in tourism

The rapid digitalization of tourism has transformed tourism systems into increasingly interconnected platform-based ecosystems characterized by data exchange, stakeholder interdependence, and digitally mediated value creation. Early smart tourism research primarily conceptualized tourism ecosystems as socio-technical infra-structures integrating ICT systems, tourism actors, and real-time information flows

to support destination intelligence and service integration [16]. More recent studies extend this perspective by emphasizing platformization processes through which tourism platforms coordinate interactions among tourists, service providers, destinations, and third-party actors within digitally interconnected ecosystems [17, 18].

Within this context, digital platforms increasingly operate as ecosystem orchestrators rather than transactional intermediaries, supporting interoperability, service integration, stakeholder coordination, and platform-enabled value co-creation across tourism environments [9, 19]. Recent bibliometric studies further demonstrate that smart tourism research progressively evolved from isolated ICT applications toward integrated digital platform ecosystems characterized by interconnected infrastructures and ecosystem coordination mechanisms [11, 20].

These developments indicate the transformation of tourism platforms from infra-structural digital systems toward interconnected ecosystem architectures. Accordingly, Objective O1 examines

how AI-driven systems support predictive analytics, intelligent recommendation systems, conversational interaction, and adaptive tourism services within smart tourism environments [4]. The growing the longitudinal evolution of digital platform ecosystem research in tourism between 2015 and 2026.

2.2 AI-driven smart tourism ecosystems

Artificial intelligence, machine learning, big data analytics, and IoT increasingly constitute the intelligence layer of contemporary tourism platform ecosystems. Recent research emphasizes diffusion of generative AI further accelerates the transformation of tourism platforms into intelligent ecosystems capable of automated decision-making, dynamic customer engagement, and personalized service orchestration [15].

Research also highlights the increasing role of data-driven infrastructures in behavioural prediction, operational optimization, and digitally mediated interaction. IoT-enabled systems and big data analytics support real-time monitoring and intelligent tourism management, while network-based studies reveal growing structural complexity through platform hubs, interaction patterns, and algorithmically mediated customer behaviour [10]. At the same time, AI adoption generates new challenges regarding privacy, transparency, and algorithmic control within tourism ecosystems [4].

The increasing integration of AI, predictive analytics, and intelligent interaction systems suggests that tourism platforms are evolving toward adaptive and data-driven ecosystem architectures. Consequently, Objective O2 seeks to identify the thematic evolution of AI-enabled personalization, intelligent interaction, and platform-mediated customer engagement within smart tourism research.

2.3 Platform governance, immersive technologies, and sustainability

Recent research increasingly connects tourism platform ecosystems with governance, sustainability, resilience, and immersive experiential transformation. Studies on accessibility and inclusive tourism demonstrate how digital platforms support service coordination, information accessibility, and user inclusion through platform-enabled interaction and universal design approaches [12]. Sustainability-oriented studies further emphasize the role of digital ecosystems in supporting environmental management, community engagement, resilience, and adaptive destination governance [21, 22].

At the same time, tourism platforms increasingly integrate immersive technologies, AI-supported interfaces, and digital storytelling mechanisms into customer interaction systems designed to facilitate emotional engagement, co-creation, and digitally mediated tourism experiences. Innovation-oriented studies further show that ecosystem collaboration, organizational learning, and digital capability development are becoming central drivers of competitiveness and platform-enabled tourism innovation [23, 24].

The convergence between immersive technologies, governance coordination, sustainability management, and ecosystem orchestration highlights the growing complexity of contemporary tourism platform ecosystems. Therefore, Objective O3 investigates how governance, sustainability coordination, immersive interaction, and eco-system-level orchestration increasingly shape the conceptual structure of smart tourism ecosystems. In parallel, Objective O4 explores whether these emerging themes are also reflected in platform-level strategic communication through an exploratory qualitative analysis of Booking.com corporate communications published during 2023–2026.

3. Methodology

This study employs a bibliometric and exploratory discourse analysis approach to investigate the evolution of digital platform ecosystems and emerging technologies in tourism research. Bibliometric methods are widely used to identify thematic structures, conceptual relationships, and emerging research trajectories within interdisciplinary fields [25]. The approach is particularly suitable for tourism platform research, where digital transformation, artificial intelligence, governance, and smart tourism intersect across multiple disciplines.

The bibliometric dataset was collected from the Web of Science Core Collection on May 15, 2026. Web of Science was selected due to its high-quality indexing standards, citation tracking capabilities, and broad disciplinary coverage frequently used in bibliometric studies [25]. The search query was applied to the Topic field (TS), including titles, abstracts, and keywords:

TS=("digital ecosystem*" OR "platform ecosystem*" OR "digital platform*" OR "platform economy" OR "smart tourism")

The filtering process was designed to ensure thematic consistency and analytical relevance. The analysis included English-language articles, review articles, proceedings papers, and early access publications indexed in Web of Science between 2015 and 2026 across relevant tourism, management,

business, and technology-related categories. To capture the longitudinal evolution of the field, the dataset was divided into three temporal periods: 2015–2019, 2020–2022, and 2023–2026, corresponding respectively to the expansion of smart tourism infrastructures, pandemic-driven digital acceleration, and the emergence of AI-driven tourism ecosystems. The final dataset comprised 447 publications, including 85 documents for 2015–2019, 140 for 2020–2022, and 222 for 2023–2026, indicating a substantial increase in research interest over time.

The bibliometric analysis was conducted using VOSviewer (version 1.6.20). Bibliographic records exported from Web of Science were processed using the “Create a map based on text data” function. Text mining procedures were applied to titles and abstracts using the full counting method, while structured abstract labels and copy-right statements were excluded to improve conceptual consistency. A minimum occurrence threshold of 5 was applied for term inclusion. VOSviewer clustering algorithms were subsequently used to generate co-occurrence networks and identify thematic structures, conceptual relationships, and emerging technological trajectories within the literature [25].

To complement the bibliometric findings, the study also incorporated an exploratory qualitative analysis of Booking.com corporate communications published between 2023 and 2026. Booking.com was selected as an illustrative case due to its global platform dominance, extensive integration of digital technologies, and strategic relevance within contemporary smart tourism ecosystems. The analysis focused exclusively on the 2023–2026 period to ensure direct alignment with the most recent bibliometric phase characterized by AI-driven platform ecosystems, generative AI adoption, intelligent personalization, immersive experiences, sustainability governance, and platform-based ecosystem coordination.

The Booking.com materials were collected from the company’s official newsroom on May 15, 2026. The selected communications addressed artificial intelligence, customer experience, ecosystem partnerships, digital transformation, sustainability, governance, resilience, and destination management. The materials were subsequently interpreted according to the thematic clusters identified through the bibliometric analysis. Rather than functioning as a formal content analysis, the exploratory review was intended to provide illustrative evidence regarding the parallel evolution of academic smart tourism research and platform-level digital transformation discourse.

4. Results

4.1 Subject Categories Overview

The analysis of Web of Science subject categories shows an evolving interdisciplinary structure across the three temporal periods. In the first period (2015–2019), the most represented categories were Computer Science Theory Methods (27.1%), Computer Science Information Systems (23.5%), Hospitality Leisure Sport Tourism (21.2%), and Engineering Electrical Electronic (20.0%). Additional categories

included Computer Science Interdisciplinary Applications (12.9%), Business (11.8%), and Green Sustainable Science Technology (10.6%).

During the second period (2020–2022), Computer Science Information Systems became the dominant category (32.1%), followed by Hospitality Leisure Sport Tourism (29.3%), Telecommunications (22.9%), and Engineering Electrical Electronic (21.4%). The categories Management (16.4%), Computer Science Theory Methods (11.4%), and Computer Science Interdisciplinary Applications (10.0%) also increased in representation.

In the third period (2023–2026), Hospitality Leisure Sport Tourism became the most represented category (36.9%), followed by Computer Science Information Systems (18.5%), Computer Science Interdisciplinary Applications (18.0%), and Management (17.1%). The categories Business (14.4%), Engineering Electrical Electronic (10.8%), Environmental Studies (9.9%), and Computer Science Artificial Intelligence (9.5%) also showed notable representation.

Across the three periods, the dataset included categories related to tourism, computer science, engineering, management, business, sustainability, and environmental studies, reflecting the multidisciplinary composition of the research field.

4.2 Trends of Publications and Citations

Figure 1 presents the annual distribution of publications and citations between 2015 and 2026. The dataset shows a progressive increase in scientific production over the analysed period, with a particularly visible growth after 2019. Publication output increased from 5 documents in 2015 to 35 documents in 2019 within the first slice. During the second period (2020–2022), annual publications remained above 38 documents and reached 58 publications in 2022. In the most recent period (2023–2026), publication activity continued to increase, with 82 publications recorded in 2025.

The citation trend followed a similar trajectory, showing a continuous increase across the analysed years. Citation growth became more pronounced after 2020 and reached its highest level in 2025. The lower citation level observed for 2026 is associated with the recency of publications and shorter citation accumulation time.

The most cited publications also reflect the thematic evolution of the field across the three temporal periods. In the first period (2015–2019), highly cited studies focused primarily on smart tourism, digital transformation, and connected technologies. The most cited article was “Smart tourism: foundations and developments” by Gretzel et al. [16], published in *Electronic Markets*, with 1,049 citations. Other influential publications included “Internet of Things and Big Data Analytics for Smart and Connected Communities” [26], with 583 citations, and “The digital revolution in the travel and tourism industry” [27], with 404 citations.

During the second period (2020–2022), the most cited publications increasingly addressed artificial intelligence, robotics, and smart tourism infrastructures. The article “Realizing the Potential of Internet

of Things for Smart Tourism with 5G and AI” [28] received 203 citations, followed by “The adoption of artificial intelligence and robotics in the hotel industry: prospects and challenges” [29], with 198 citations. Another highly cited contribution was “Artificial intelligence: a systematic review of methods and applications in hospitality and tourism” [30], with 187 citations.

In the third period (2023–2026), the most cited studies focused on Industry 4.0, AI-enabled tourism services, personalization, and virtual environments. The article “Charting the progress of technology adoption in tourism and hospitality in the era of Industry 4.0” [31] emerged as the most cited publication within this period. Additional highly cited studies addressed personalized tourism recommendation systems and metaverse-based tourism experiences.

4.3 Keyword Co-Occurrence Patterns

Keyword co-occurrence analysis was conducted using VOSviewer to identify the conceptual structure and thematic evolution of research on digital platform ecosystems in tourism. Separate co-occurrence maps were generated for each temporal period using author keywords and full counting. Figures 2–4 present the resulting keyword networks for the three time slices.

4.3.1 Keyword Co-Occurrence Patterns (2015–2019)

The co-occurrence analysis for the first period (2015–2019) generated a relatively dispersed network composed of several interconnected technology- and tourism-related themes. As shown in Fig. 2, the network was structured around keywords associated with smart tourism systems, digital infrastructures, and platform-enabled services. The largest nodes in the network included value (32 occurrences), IoT (24 occurrences), user (24 occurrences), smart city (23 occurrences), platform (22 occurrences), and network (21 occurrences).

Source: authors’ processing in VOSviewer, using Web of Sciences indexed articles

Figure 2 also shows the strong presence of smart tourism and digital infrastructure concepts, including smart destination, ICT, digital platform, mobile application, blockchain, and big data analytic. Tourism-oriented terms such as hospitality, tourist attraction, stakeholder, and visitor were closely connected with technological keywords, indicating an emerging integration between tourism services and digital technologies during this period.

4.3.2 Keyword Co-Occurrence Patterns (2020–2022)

The keyword network for the second period (2020–2022) became substantially denser and more interconnected. Figure 3 illustrates the expansion of digitalization- and AI-related concepts within the research field. The most frequently occurring keywords included algorithm (40 occurrences), effect (40 occurrences), literature (36 occurrences), factor (35 occurrences), intention (34 occurrences), hospitality (27 occurrences), and knowledge (27 occurrences).

Source: authors' processing in VOSviewer, using Web of Sciences indexed articles

As shown in Fig. 3, the network included a larger number of technology-oriented nodes, such as artificial intelligence algorithm, chatbot, cloud computing, virtual reality, blockchain technology, and 5g technology. Terms associated with tour-ism digitalization and online interaction, including digital platform, digitalization, customer, online review, social media, and smart tourism destination, also occupied central positions within the network. Figure 3 further demonstrates the growing presence of review- and synthesis-oriented research terms, including bibliometric analysis, systematic review, literature review, and integrative conceptual framework.

4.3.3 Keyword Co-Occurrence Patterns (2023–2026)

The third period (2023–2026) produced the most complex and diversified key-word network. As presented in Fig. 4, the network structure expanded considerably, incorporating a broader range of AI-driven, governance-related, and immersive technology concepts. The most frequent keywords included hospitality (54 occurrences), intention (52 occurrences), algorithm (47 occurrences), engagement (39 occurrences), performance (39 occurrences), metaverse (37 occurrences), relationship (37 occurrences), and gap (35 occurrences).

Source: authors' processing in VOSviewer, using Web of Sciences indexed articles

Figure 4 highlights the increasing visibility of AI-related terms, including generative artificial intelligence, ChatGPT, machine learning, natural language processing, ai adoption, and conversational agent. Additional emerging technology concepts included metaverse tourism, immersive technology, digital ecosystem, smart technology, and blockchain technology.

The network shown in Fig. 4 also contained governance- and sustainability-related keywords, such as governance, business model, privacy, cybersecurity risk, sustainable tourism, and sustainable development. Tourism experience and interaction terms, including tourist experience, visitor experience, personalization, engagement, and value co-creation, were strongly interconnected with technological and plat-form-related concepts.

Across the three temporal periods, the keyword co-occurrence networks show an increasing expansion of technology-oriented, platform-related, and AI-driven research themes, together with a growing diversification of tourism ecosystem concepts.

4.4. Thematic clusters

The thematic structure of the field was examined through keyword co-occurrence analysis for the three time slices. This approach makes it possible to observe not only the dominant topics in each period, but also the evolution of conceptual linkages among digital platforms, smart tourism technologies, data-driven management, plat-form governance, and emerging technology-enabled tourism ecosystems.

4.4.1. Thematic clusters (2015–2019)

The keyword co-occurrence analysis for 2015–2019 identified 62 items grouped into seven clusters, reflecting the formative stage of smart tourism and digital platform ecosystem research. The dominant keywords included “value”, “IoT”, “user”, “platform”, “network”, “stakeholder”, “strategy”, and “smart city”, indicating that early studies primarily focused on ICT infrastructures, connectivity, interoperability, and the integration of digital technologies into tourism systems.

The red cluster (C1) emphasized big data analytics, social networks, cultural heritage, and user experience, highlighting the increasing use of user-generated content, online reviews, and ICT-supported destination intelligence systems for visitor engagement and heritage interpretation [32–34]. The green cluster (C2) conceptualized smart tourism as an integrated socio-technical system linking ICT infrastructures, operational processes, and technology-mediated tourism experiences [16, 35]. The blue cluster (C3) reflected the emergence of platform- and network-based tourism infrastructures through algorithms, sensors, recommendation systems, and web-based service architectures [36, 37]).

The yellow cluster (C4) focused on blockchain, digital platforms, mobile technologies, and fake reviews, indicating growing concern regarding trust, transparency, and verification mechanisms in digital tourism environments [38, 39]. The purple cluster (C5) emphasized smart destinations, stakeholders, governance, and tourism distribution channels, reflecting increasing attention toward destination competitiveness, ecosystem coordination, and smart city integration [40, 41]. The turquoise cluster (C6) captured the early use of augmented reality, mobile applications, and immersive technologies in hospitality and cultural tourism [42, 43]. Finally, the orange cluster (C7) highlighted IoT-enabled hospitality systems, customer analytics, and intelligent tourism services supporting operational efficiency and customer satisfaction [44, 45].

Overall, the 2015–2019 clusters conceptualized tourism platforms primarily as digital infrastructures focused on connectivity, interoperability, smart destination integration, and the technological foundations of emerging tourism ecosystems.

4.4.2. Thematic clusters (2020–2022)

The keyword co-occurrence analysis for 2020–2022 identified 143 items grouped into six clusters, indicating the rapid expansion and technological maturation of smart tourism and digital platform ecosystem research. Compared with the previous period, the literature increasingly emphasized AI-enabled systems, behavioural analytics, digital coordination, immersive experiences, and platform-mediated tourism services. Dominant keywords included “algorithm”, “impact”, “intention”, “hospitality”, “behaviour”, “satisfaction”, “covid”, and “relationship”.

The red cluster (C1) reflected the consolidation of smart tourism as a computational and data-intensive ecosystem integrating AI algorithms, blockchain infrastructures, cloud computing, privacy, and immersive technologies. Research increasingly focused on machine learning, recommendation systems, route optimization, cybersecurity, and data governance within interconnected tourism environments [46–48]. The green cluster (C2) emphasized conceptual consolidation and ecosystem governance through

literature reviews, stakeholder coordination, smart destination management, and digital transformation frameworks [1, 33, 49].

The blue cluster (C3) highlighted the growing importance of platform-mediated customer behaviour, personalization, online reviews, and real-time connectivity enabled by digital platforms and 5G technologies [50–52]. The yellow cluster (C4) captured the acceleration of virtualization and digitally mediated tourism experiences during the COVID-19 pandemic, particularly through VR/AR applications, contactless technologies, and technology acceptance models associated with immersive tourism experiences ([53–55].

The purple cluster (C5) focused on automation, robotics, chatbot systems, and digital transformation as drivers of organizational competitiveness and operational resilience in tourism and hospitality [29, 56, 57]. Finally, the turquoise cluster (C6) emphasized big social data, smart tourism destinations, gamification, sustainability-oriented innovation, and destination intelligence supported by social media analytics and behavioural data [58–60].

Overall, the 2020–2022 clusters reveal the transition from infrastructure-oriented smart tourism toward adaptive platform coordination systems characterized by resilience, virtualization, behavioural analytics, and digitally mediated interaction.

4.4.3. Thematic clusters (2023–2026)

The keyword co-occurrence analysis for 2023–2026 identified 252 items grouped into six clusters, reflecting the diversification and increasing complexity of AI-driven tourism platform ecosystems. The dominant keywords included “hospitality”, “intention”, “algorithm”, “engagement”, “metaverse”, “relationship”, “behaviour”, “satisfaction”, and “smart tourism destination”, indicating a clear shift toward AI-enabled personalization, intelligent interaction, immersive tourism, ecosystem governance, and sustainability-oriented coordination.

The red cluster (C1) emphasized AI-supported service infrastructures through keywords such as machine learning, natural language processing, conversational agents, IoT technologies, and augmented reality. Research increasingly focused on predictive analytics, deep learning, chatbot systems, recommendation accuracy, and adaptive tourism services enabled by generative AI and intelligent interaction systems [7, 61–63]. The green cluster (C2) reflected the growing maturity of the field through bibliometric analyses, systematic reviews, digitalization studies, and customer experience research examining AI, blockchain, VR, IoT, and ecosystem governance within smart tourism environments [5, 64, 65].

The blue cluster (C3) captured the behavioural and experiential turn in smart tourism research through concepts such as engagement, trust, perception, generative AI, ChatGPT, and technology acceptance. Studies increasingly examined AI-mediated customer interaction, emotional attachment, behavioural intention, and trust-building mechanisms associated with intelligent tourism services and anthropomorphic AI systems [66–68]. The yellow cluster (C4) connected metaverse tourism, blockchain

technologies, immersive interaction, online reviews, cybersecurity, and phygital tourism experiences, reflecting the growing integration of immersive environments, decentralized trust systems, and AI-enabled customer analytics within tourism ecosystems [15, 63, 69].

The purple cluster (C5) emphasized ecosystem-level transformation through digital governance, personalization, AI adoption, sustainable development, and open-data infrastructures. Research increasingly conceptualized tourism platforms as interconnected ecosystems integrating AI, IoT, big data, and governance-oriented co-ordination mechanisms supporting destination competitiveness and intelligent tourism management [70–72]. Finally, the turquoise cluster (C6) focused on resilience, competitiveness, adaptive governance, and sustainable tourism development, highlighting the growing role of digital innovation and AI-enabled coordination in post-pandemic destination management and long-term ecosystem sustainability [73–75].

Overall, the 2023–2026 clusters demonstrate the emergence of AI-driven intelligent tourism ecosystems integrating personalization, immersive interaction, governance coordination, sustainability management, and ecosystem-level orchestration.

4.5. Exploratory platform discourse analysis: Booking.com (2023–2026)

To ensure analytical consistency with the thematic structure identified in Section 4.4.3, the exploratory platform discourse analysis was organized into three overarching dimensions: (1) AI-enabled personalization and intelligent interaction (Clusters 1 and 3); (2) platform ecosystems, immersive experiences, and digital governance (Clusters 2, 4, and 5); and (3) sustainability, resilience, and destination coordination (Cluster 6). The analysis included 42 Booking.com newsroom communications published between 2023 and 2026. Clusters 1 and 2 accounted for the largest share of the dataset (8 communications each), followed by Cluster 4 (7), Clusters 3 and 6 (6 each), and Cluster 5 (5).

4.5.1. AI-enabled personalization and intelligent interaction

The analysed communications strongly reflect the themes identified in Clusters 1 and 3, particularly AI-enabled personalization, intelligent interaction systems, conversational assistance, and behaviour-driven customer engagement. Booking.com increasingly frames AI not simply as a technological enhancement, but as an infrastructural mechanism supporting adaptive recommendation systems, predictive analytics, and digitally mediated tourism experiences.

Several communications emphasize the growing role of generative AI and conversational interfaces in tourism intermediation. The launch of the AI Trip Planner and later Agentic AI innovations positioned AI-supported systems as tools for adaptive travel planning, conversational interaction, and context-aware customer assistance throughout the tourism decision-making process [76, 77]. These narratives closely

correspond to the bibliometric clusters centred on machine learning, natural language processing, conversational agents, and intelligent tourism infrastructures.

The discourse also increasingly frames AI adoption through trust, transparency, emotional engagement, and behavioural intention. Booking.com's Global AI Sentiment Report highlighted both enthusiasm and concerns regarding AI-supported travel services, particularly related to privacy, transparency, and responsible AI use [78]. Similarly, trend-oriented communications and research on neurodivergent travellers emphasized adaptive personalization, accessibility, and emotionally meaningful tourism experiences supported by intelligent systems and predictive analytics [79, 80]. These themes strongly align with recent smart tourism research emphasizing AI-mediated engagement, technology acceptance, behavioural analytics, and user-centred tourism ecosystems.

Communications additionally demonstrate increasing emphasis on ecosystem interoperability and integrated digital services. Strategic integrations such as the Fare-Harbor partnership illustrate how digitally connected tourism infrastructures increasingly support coordinated platform ecosystems and adaptive customer journeys [81]. Overall, the discourse suggests that AI-supported personalization and intelligent interaction systems are becoming central mechanisms structuring customer engagement and tourism platform coordination.

4.5.2. Platform ecosystems, immersive experiences, and digital governance

The communications associated with Clusters 2, 4, and 5 reveal the growing convergence between platform governance, immersive tourism experiences, ecosystem integration, and digitally mediated consumer engagement. Booking.com increasingly positions tourism platforms as interconnected socio-technical ecosystems linking destinations, entertainment industries, hospitality services, and platform-mediated experiences.

Several communications emphasize digital transformation and organizational adaptation within platform ecosystems. Initiatives such as the AI Tech Stack Advisor framed AI-supported decision systems as mechanisms for accelerating hospitality digitalization, improving operational efficiency, and supporting technology adoption among accommodation providers [82]. Similarly, communications regarding workforce preparedness and hospitality-sector skills gaps highlighted the strategic importance of AI capabilities and organizational adaptation within digitally mediated tourism ecosystems [83].

The discourse also demonstrates the increasing platformization of immersive and emotionally engaging tourism experiences. Collaborations with Ludacris and Warner Bros. transformed tourism consumption into branded and narrative-driven experiences integrating entertainment culture, emotional storytelling, and digital engagement ([84, 85]. Communications promoting "Instagrammable" destinations and immersive hospitality environments further illustrate how tourism platforms increasingly integrate social visibility, sensory immersion, and lifestyle-oriented branding into tourism intermediation [86, 87].

Similarly, the Traveller Review Awards reinforced the growing importance of online reviews, customer-generated visibility, and digitally mediated reputation systems within platform ecosystems [88].

Cluster 5 communications additionally highlighted ecosystem partnerships and destination-level coordination. Collaborations with organizations such as Sydney WorldPride, Eurovision, Major League Baseball, and IGLTA demonstrate how Booking.com increasingly positions itself within globally interconnected cultural, entertainment, and identity-based tourism ecosystems [89–92]. Overall, the discourse confirms the increasing convergence between immersive tourism, ecosystem governance, strategic partnerships, and digitally coordinated platform ecosystems.

4.5.3. Sustainability, resilience, and destination coordination

The communications associated with Cluster 6 highlight the growing centrality of sustainability, resilience, adaptive governance, and destination-level coordination within tourism platform ecosystems. Booking.com increasingly frames sustainability as a governance-oriented and data-driven process involving stakeholder collaboration, behavioural transformation, and long-term destination resilience.

Several communications emphasize collaborative sustainability governance and ecosystem-wide coordination mechanisms. Sustainability-oriented reports repeatedly stressed the importance of cooperation among destinations, accommodation providers, certification systems, tourism stakeholders, and travellers in facilitating sustainable tourism practices [93, 94]. The discourse also demonstrates the increasing role of data-driven sustainability frameworks in shaping tourist behaviour and destination management strategies. Communications promoting sustainable destinations and resident-informed tourism practices framed sustainability through accessibility, responsible tourism behaviour, and community-centred governance [95, 96].

Institutional trust and standardization also emerged as important dimensions of sustainability governance. Booking.com's transition toward prioritizing third-party sustainability certifications reflected efforts to strengthen transparency, accountability, and informational credibility within tourism platform ecosystems [97]. In parallel, sustainability programs targeting accommodation providers increasingly positioned the platform as a coordinator of operational transformation, encouraging tourism stakeholders to adopt sustainability-oriented reporting mechanisms and governance standards [97].

The analysed communications reinforce the bibliometric findings showing that contemporary tourism platforms increasingly integrate sustainability coordination, adaptive governance, resilience, and ecosystem-level destination management within digitally mediated tourism ecosystems.

5. Discussion

The findings reveal a clear longitudinal transformation in the conceptualization of tourism platform ecosystems between 2015 and 2026. Rather than representing a simple accumulation of technology-

oriented themes, the thematic evolution identified across the three periods reflects a broader transition from infrastructure-centred digitalization toward AI-driven ecosystem orchestration. Across the identified clusters, tourism platforms progressively evolved from being conceptualized as enabling digital infrastructures, into adaptive coordination systems during the pandemic period, and ultimately into intelligent platform ecosystems characterized by AI-enabled personalization, immersive interaction, sustainability coordination, and governance-oriented orchestration.

The first period (2015–2019) primarily conceptualized tourism platforms as foundational digital infrastructures embedded within the expansion of smart tourism and smart city ecosystems. Clusters C1, C2, and C3 were strongly centred on ICT, IoT, smart tourism systems, algorithms, digital platforms, sensors, and network-based infrastructures, indicating that early research focused mainly on connectivity, interoperability, destination intelligence, and platform-enabled information exchange [1, 16, 26]. Cluster C1 emphasized digital analytics, social networks, user experience, and visitor-oriented data ecosystems, while Cluster C2 framed smart tourism as an integrated socio-technical system linking ICT infrastructures, operational processes, and smart tourism experiences. Cluster C3 further reinforced the infrastructural logic of early smart tourism research through the association between algorithms, networks, platforms, and sensor-enabled destination services. Simultaneously, Clusters C4 and C5 introduced early concerns regarding platform governance, trust, blockchain, stakeholder coordination, and smart destination management, whereas Clusters C6 and C7 highlighted the growing role of mobile applications, augmented reality, IoT, and intelligent hospitality services in shaping digitally mediated tourism experiences. Overall, the first phase conceptualized tourism platforms primarily as digital infrastructures supporting connectivity, service integration, and destination-level digital transformation.

The second period (2020–2022) reflects a major conceptual transition toward adaptive and data-driven platform coordination systems. Compared with the earlier phase, the thematic structure became substantially denser and more interconnected, reflecting the acceleration of digital transformation during the COVID-19 pandemic. Cluster C1 increasingly emphasized artificial intelligence algorithms, blockchain technologies, cloud computing, privacy, cybersecurity, and immersive technologies, indicating that tourism platforms were progressively conceptualized as computational and data-intensive infrastructures capable of supporting intelligent tourism services. Cluster C2 marked a stronger move toward conceptual consolidation and ecosystem theorization through themes related to adoption, stakeholder coordination, destination management, literature reviews, and integrative frameworks. In parallel, Cluster C3 demonstrated the growing relevance of platform-mediated customer behaviour, online reviews, satisfaction, recommender systems, and real-time connectivity enabled through digital platforms and 5G technologies. Cluster C4 strongly reflected pandemic-driven virtualization through the increasing visibility of virtual reality, contactless technologies, and digitally mediated tourism experiences. At the organizational level, Cluster C5 highlighted digitalization, robotics, chatbot interaction, operational performance, and AI-assisted service systems, suggesting that tourism platforms increasingly operated as adaptive coordination mechanisms supporting resilience and operational continuity under uncertainty. Finally, Cluster C6 introduced growing concerns regarding big social data, smart tourism destinations, sustainability-oriented innovation, gamification, and governance-

related risks within interconnected tourism eco-systems. Together, these clusters demonstrate that the pandemic period accelerated the transformation of tourism platforms from infrastructural systems into adaptive socio-technical coordination environments characterized by digital resilience, behavioural analytics, and platform-mediated service orchestration.

The third period (2023–2026) marks the transition toward AI-driven intelligent tourism ecosystems. The thematic structure identified during this phase became considerably more diversified, integrating generative artificial intelligence, machine learning, conversational agents, metaverse tourism, immersive interaction, ecosystem governance, sustainability coordination, and predictive personalization into increasingly interconnected platform ecosystems. Cluster C1 demonstrated the strong consolidation of AI-enabled service infrastructures through keywords such as algorithm, machine learning, natural language processing, conversational agent, IoT technology, and augmented reality. Unlike earlier periods, AI was no longer framed merely as a supporting technology, but increasingly as a core mechanism for adaptive interaction, intelligent recommendation systems, predictive analytics, and real-time personalization. Cluster C2 reflected the growing maturity of the field through stronger emphasis on digitalization, customer experience, systematic reviews, hospitality transformation, and ecosystem governance. This suggests that smart tourism research increasingly evolved toward reflexive and integrative approaches examining AI-driven digital transformation at both organizational and ecosystem levels.

At the behavioural level, Cluster C3 highlighted the growing convergence between generative AI, engagement, trust, perception, satisfaction, and behavioural intention. The emergence of terms such as “ChatGPT,” “generative artificial intelligence,” and “technology acceptance model” demonstrates that recent research increasingly conceptualizes AI as an experiential mediator shaping emotional engagement, perceived usefulness, trust formation, and digitally mediated tourism interaction. Simultaneously, Cluster C4 connected immersive tourism experiences with metaverse environments, blockchain technologies, sentiment analysis, online reviews, cybersecurity risk, and phygital interaction systems. These findings indicate that tourism platforms increasingly integrate entertainment ecosystems, immersive environments, customer-generated reputation systems, and AI-enabled personalization within unified digital experience architectures.

At the ecosystem level, Cluster C5 strongly emphasized governance, personalization, digital ecosystems, AI adoption, sustainable development, and tourism growth. This cluster reflects the increasing transformation of tourism platforms into intelligent ecosystem orchestrators coordinating data infrastructures, destination management systems, personalization mechanisms, and governance-oriented digital ecosystems simultaneously. Finally, Cluster C6 positioned resilience, adaptability, sustainability, competitiveness, and destination management as central ecosystem dimensions, indicating that post-pandemic tourism research increasingly frames digital innovation as a strategic capability supporting long-term destination coordination and adaptive governance under conditions of uncertainty.

Importantly, the findings demonstrate that this transformation is not exclusively technological, but increasingly behavioural, organizational, and governance oriented. Across the three periods, the thematic clusters progressively shifted from infrastructure-centred digitalization toward ecosystem-level orchestration integrating AI-enabled personalization, immersive interaction, platform governance, sustainability coordination, and adaptive destination management simultaneously. The increasing interconnection between Clusters C1, C3, C5, and C6 during the most recent period particularly suggests that tourism platforms increasingly function as intelligent socio-technical ecosystems rather than simple digital intermediaries.

The exploratory analysis of Booking.com communications further reinforce this longitudinal trajectory. The platform discourse closely mirrors the thematic evolution identified in the bibliometric analysis, particularly regarding AI-enabled personalization, conversational interfaces, ecosystem partnerships, immersive tourism experiences, sustainability governance, and adaptive destination coordination. Booking.com increasingly frames AI as an infrastructural capability supporting intelligent recommendation systems, predictive customer engagement, adaptive interaction, and platform interoperability rather than merely as a technological add-on. Simultaneously, sustainability and governance are progressively integrated into broader ecosystem co-ordination narratives involving destinations, accommodation providers, local communities, certification systems, and digitally mediated customer experiences.

Overall, the findings suggest a growing convergence between academic smart tourism research and platform-level strategic discourse. While early smart tourism studies primarily emphasized ICT infrastructures, digital connectivity, and platform-enabled services, contemporary tourism ecosystems increasingly integrate AI-driven personalization, immersive interaction systems, governance coordination, sustainability management, and predictive ecosystem intelligence within unified platform architectures. The study therefore contributes to the smart tourism and digital platform literature by proposing a longitudinal conceptual interpretation of tourism platform evolution structured around three interconnected stages: (1) platforms as digital infrastructures (2015–2019), (2) platforms as adaptive coordination systems (2020–2022), and (3) platforms as AI-driven intelligent ecosystems (2023–2026). This meta-narrative extends existing bibliometric research by demonstrating how the conceptual role of tourism platforms progressively evolved in response to digital transformation, pandemic-driven acceleration, generative AI expansion, and increasing ecosystem governance complexity.

These longitudinal transformations are conceptually synthesized in Fig. 5, which illustrates the evolutionary transition from infrastructural digital tourism platforms toward AI-driven intelligent ecosystem orchestration.

The proposed framework conceptualizes the evolution of tourism platforms as a transition from connectivity-oriented digital infrastructures toward intelligent ecosystem orchestrators integrating AI-enabled personalization, immersive interaction, adaptive governance, and sustainability-oriented coordination mechanisms.

6. Conclusions

6.1. General conclusion

This study examined the longitudinal evolution of digital platform ecosystems in tourism between 2015 and 2026 through a bibliometric and exploratory platform discourse analysis. The findings addressed O1 by demonstrating that tourism platforms evolved through three interconnected developmental stages: (1) digital infrastructure ecosystems (2015–2019), (2) adaptive platform coordination systems (2020–2022), and (3) AI-driven intelligent tourism ecosystems (2023–2026).

The study further addressed O2 and O3 by showing that recent smart tourism re-search increasingly integrates AI-enabled personalization, conversational interaction, immersive technologies, governance coordination, sustainability management, and ecosystem-level orchestration within interconnected tourism platform architectures. The findings therefore suggest that tourism platforms can no longer be understood solely through digitalization or smart tourism perspectives but increasingly require an ecosystem intelligence perspective integrating AI orchestration, adaptive governance, behavioural analytics, and sustainability-oriented coordination mechanisms.

The study also addressed O4 by demonstrating that Booking.com's strategic communications increasingly reflect the same technological and governance-oriented transformations identified in academic literature, particularly regarding generative AI, intelligent recommendation systems, immersive engagement, ecosystem partnerships, and sustainability coordination. Together, the findings indicate a growing convergence between smart tourism research and platform-level digital transformation within increasingly intelligent tourism ecosystems.

Figure 2 conceptually synthesizes these longitudinal transformations by illustrating the evolution of tourism platforms from connectivity-oriented digital infrastructures toward intelligent ecosystem orchestrators integrating AI-enabled personalization, immersive interaction, governance coordination, and sustainability-oriented platform management.

6.2. Theoretical implications

The study contributes to smart tourism and digital platform literature by moving beyond descriptive bibliometric mapping toward a longitudinal conceptual interpretation of tourism ecosystem evolution. The findings demonstrate that AI, immersive technologies, governance, sustainability, and platform coordination increasingly converge within intelligent tourism ecosystem architectures rather than operating as isolated technological domains.

The study also contributes to emerging research on AI-driven tourism ecosystems by conceptualizing tourism platforms as adaptive socio-technical orchestrators characterized by ecosystem intelligence, predictive coordination, and digitally mediated value co-creation. Methodologically, the integration of bibliometric analysis with exploration platform discourse analysis further connects academic developments with industry-level strategic narratives. This integration further extends existing tourism

platform research by linking longitudinal academic knowledge production with platform-level strategic narratives and emerging industry practices.

6.3. Managerial implications

The findings suggest that tourism platforms increasingly compete through eco-system intelligence, AI-enabled personalization, adaptive coordination, and sustainability-oriented governance rather than transactional efficiency alone. The Booking.com analysis illustrates how leading tourism platforms increasingly integrate generative AI, conversational systems, predictive analytics, ecosystem partnerships, and immersive engagement into platform strategies and digitally mediated customer experiences.

The results further indicate that tourism organizations and destination managers should increasingly prioritize interoperability, ethical AI governance, ecosystem collaboration, sustainability coordination, and data-driven decision-making capabilities to remain competitive within rapidly evolving digital tourism ecosystems.

6.4. Limitations and future research

The study has several limitations. First, the bibliometric analysis relied exclusively on Web of Science-indexed English-language publications. Second, the exploratory discourse analysis focused only on Booking.com as an illustrative platform case. Future research could incorporate additional databases, comparative platform analyses, and empirical approaches capable of testing the proposed framework across different tourism ecosystems.

Further research is particularly needed regarding generative AI governance, conversational tourism agents, immersive metaverse environments, algorithmic transparency, predictive behavioural analytics, and sustainability-oriented ecosystem coordination within increasingly intelligent tourism platforms.

Declarations

Funding: This research was funded by Transylvania University of Brasov, 29, Eroilor Str., Brasov 500036, Romania, VAT: RO 14151658..

Institutional Review Board Statement: Not applicable

Informed Consent Statement: Not applicable

Acknowledgments: ChatGPT (version 5.3), developed by OpenAI, was used responsibly for language improvement. Following this process, the authors reviewed and edited the content as needed and take full responsibility for the content of this article.

Conflicts of Interest: The author declare no conflicts of interest.

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Figures

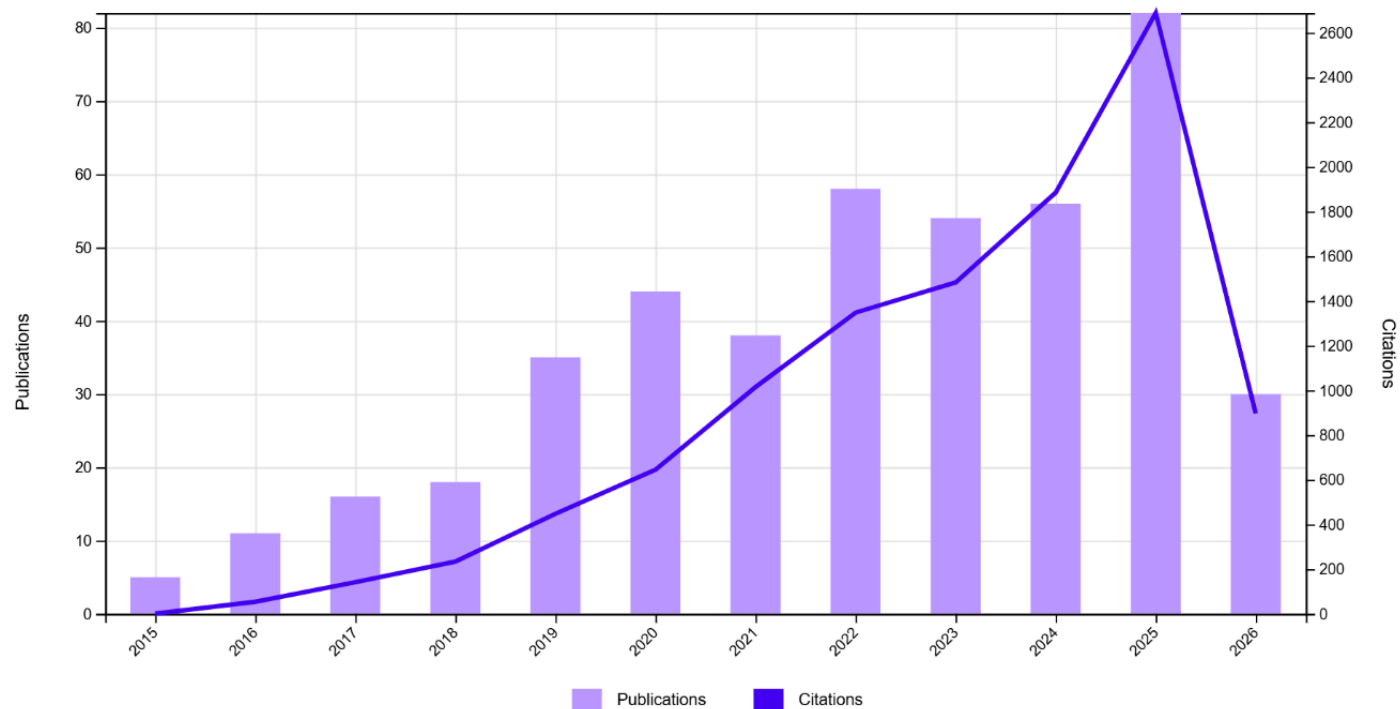


Figure 1

Annual trends of publications and citations (2015–2026). Source: Web of Science, <https://www.webofscience.com/>

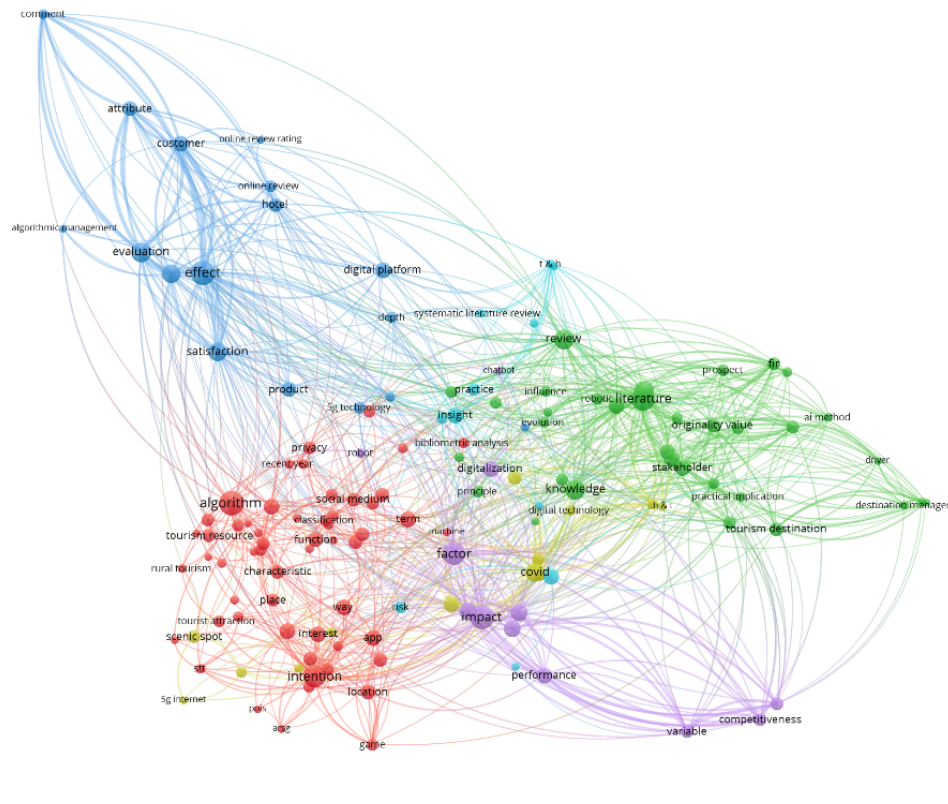
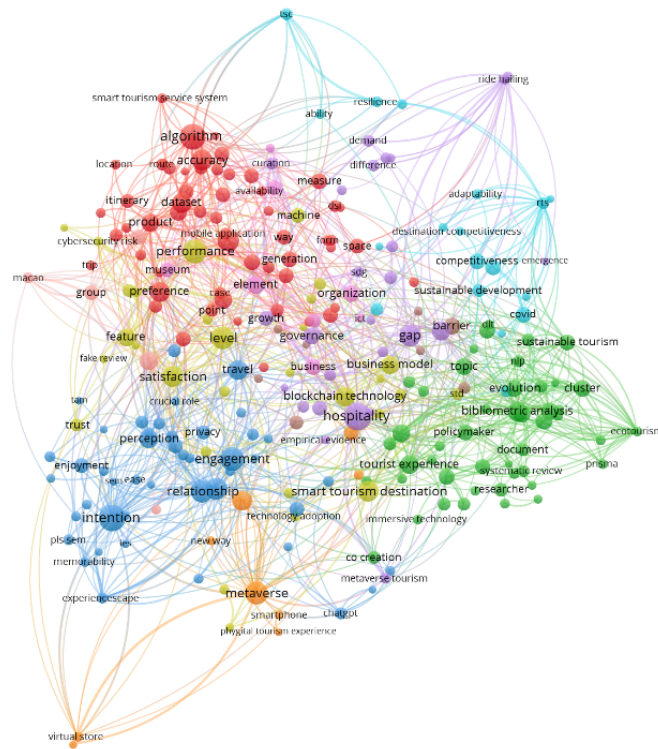


Figure 3

Keyword co-occurrence network for the period 2020–2022

Source: authors’ processing in VOSviewer, using Web of Sciences indexed articles



VOSviewer

Figure 4

Keyword co-occurrence network for the period 2023–2026

Source: authors’ processing in VOSviewer, using Web of Sciences indexed articles

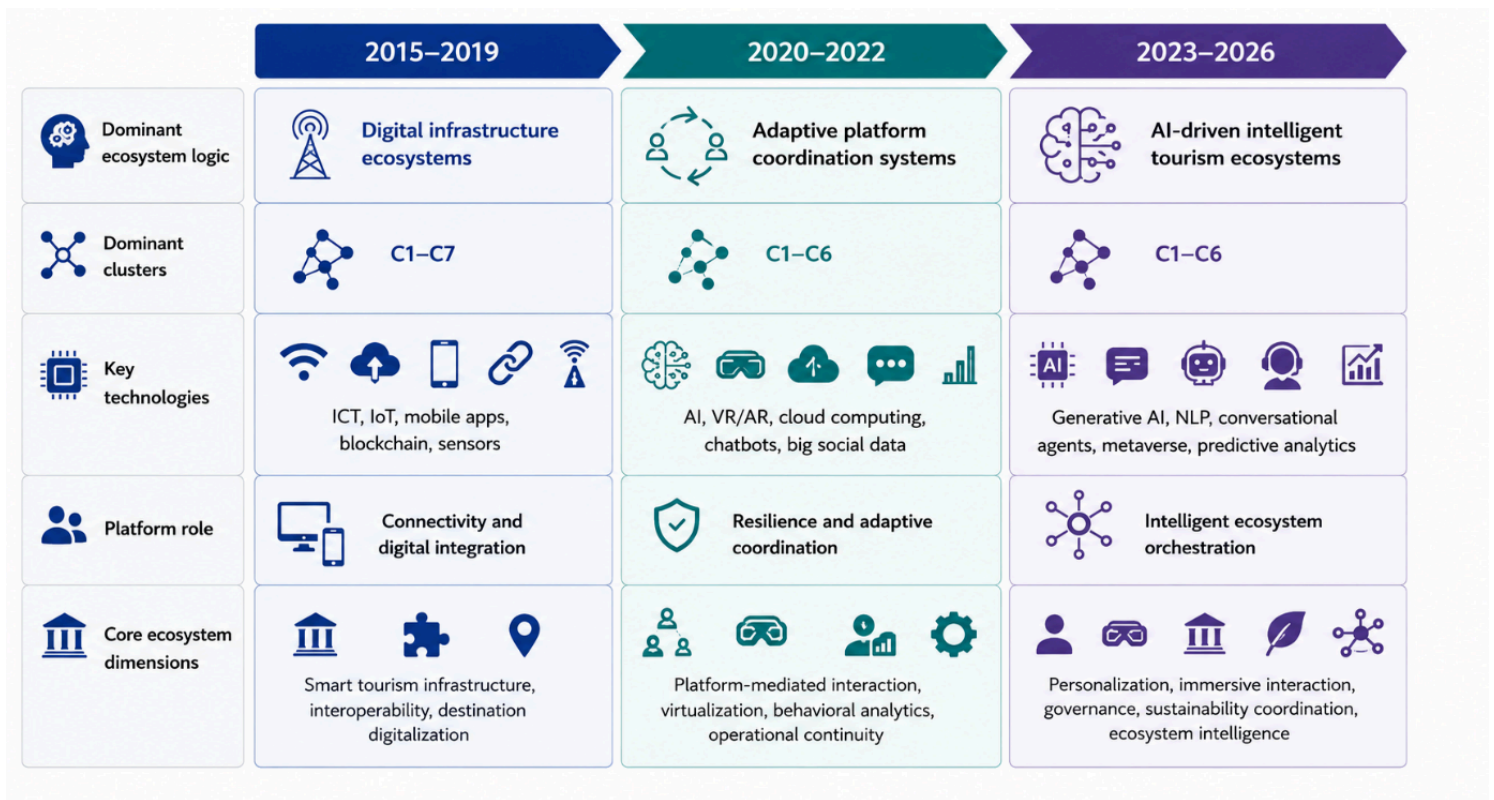


Figure 5

Evolutionary framework of tourism platform ecosystems (2015–2026). Source: Authors' own elaboration based on the bibliometric findings and exploratory platform discourse analysis; visual synthesis supported by generative AI.