



Empirical Research Article

Enhanced Smart Tourism and its Role in Reshaping the Tourism Industry

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Abstract

This paper explores the concept of enhanced smart tourism as a response to the challenges and opportunities arising in the post-pandemic tourism landscape. The COVID-19 pandemic has not only halted the global tourism industry but also prompted a reevaluation of its sustainability, technological integration, and impact on local communities. The need for a paradigm shift in tourism is emphasized, focusing on digitalization, innovation, and resilience. Enhanced smart tourism is characterized by a shift from traditional practices to innovative governance models, increased emphasis on sustainability, and the integration of technology for better management and visitor experiences. The paper discusses the four pillars of enhanced smart tourism - Technology, Sustainability, Accessibility/Mobility, and Innovation/Creativity, and their expansion in the post-pandemic era. Furthermore, the significant role of data in smart tourism is examined, highlighting the importance of data valuation, management, and ethics. The paper proposes frameworks and methods for data valuation and emphasizes the necessity of a comprehensive approach to data within the smart tourism ecosystem. The conclusion points to the need for further empirical and conceptual research to fully realize the potential of enhanced smart tourism.

Keywords

enhanced smart tourism; post-pandemic tourism; sustainability; digitalization

1. The Need for New Paradigms in Post-Pandemic Tourism

The COVID-19 pandemic pressed a pause button on tourism. Touristic movements were restricted and aircrafts that had carried eager tourists to far-flung destinations came to a standstill. Tourism development and tourism industry growth also came to a halt. However, this break in 'tourism-as-usual' also represented a collective chance to reflect on the intricacies of tourism and its related industry sectors. There was a concerted effort in both academia and industry to comprehend the unfolding situation and explore ways to mitigate its negative impacts. Especially on the academic side, many researchers highlighted the growth paradigm as a continuing challenge to sustainability in tourism, demanding new approaches like regenerative tourism (Bellato et al., 2023). Tourism scholars also discussed technology and its roles in tourism, challenging existing perceptions and conceptualizations of technology, and questioning the scientific paradigms currently employed in tourism and technology research (Gretzel et al., 2020). Emerging from these reflections is a general understanding that the post-pandemic era has brought forth a new reality that requires paradigm shifts.

The pandemic also provided an opportunity for many tourists and residents who live in tourism communities to sit back and reflect on their quality of life. Even during the pandemic, there was significant conflict between those who were engaging in tourism and those who were receiving the tourists, usually in their places of residence. Newspapers and social media reported a noticeable undercurrent of anxiety, pent-up demand and prevailing hope for a rapid resurgence of tourism, while being filled with images and

comments expressing the positive sentiment that the cessation of tourism was beneficial. Residents of Venice, for example, were delighted to witness a notable improvement in the quality of the iconic canals running through the city, to the extent that fish had become visible once again (BBC, 2020). A lot of residents experienced a sense of relief and were able to rediscover an appreciation for their own living environment. However, post-pandemic tourism snapped back to what tourism was like, perhaps even worse in some places, leaving these conflicts largely unresolved.

From a tourism industry perspective, post-pandemic tourism can be described in three dimensions: *digitalization (has improved)*, *innovation (has remained stable)* and *resilience (has diminished)*. In terms of *digitalization*, it can be asserted that the only aspect that has changed to the better is the increased utilization of technology to facilitate transactions, create efficiencies, and enable enhanced experiential opportunities. The pandemic served as a significant catalyst for digitalization. Actually, we now see even very small establishments in the tourism industry adopting various technologies. There is also a greater share of tourists, including older tourists, who are now using technologies in their travel experiences. In terms of *innovation*, it can be remarked that it is challenging to claim that there were significant and industry-wide changes. People focused on survival and demonstrated incremental innovation in specific areas. However, when considering the overall level of innovation in the industry, it remained relatively stable both during the pandemic and into the post-pandemic phase. In terms of *resilience*, it seems that the tourism industry has not made significant

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Received 28 December 2023; Received in revised form 2 February 2024; Accepted 23 January 2024

progress. Numerous destinations are facing challenges stemming from climate change, anti-tourism sentiments, and labor shortages. They are also confronted with conflicts, political, economic, technological (most notably artificial intelligence), and social changes that continue to present challenges to the tourism sector. In some respects, it seems that resilience has diminished, and the industry continues to struggle on multiple fronts. Addressing these post-pandemic challenges requires fundamental changes in the way tourism is managed and governed.

2. Paradigm Shifts through Enhanced Smart Tourism

2.1 The Promise of Enhanced Smart Tourism

This paper builds on existing literature that emphasizes the importance of smart tourism (Mehraliyev et al., 2020), highlighting that it provides an opportunity for transformative changes and outlining four reasons to support this perspective. Moving beyond pre-pandemic smart tourism initiatives that mostly focused on the implementation of visitor-facing technologies without fundamental changes to the conceptualization of tourism destinations and to tourism business ecosystems, the paper uses the notion of enhanced smart tourism. First, enhanced smart tourism is characterized by a mindset distinct from traditional tourism. It places emphasis on innovation, creativity, and a sustainable approach to engaging in tourism development and operations. Second, enhanced smart tourism introduces novel, participatory governance models that involve residents and other stakeholders and offer insight into the governance of tourism based on the premise that the tourism industry is linked with government policies, funding, and regulations. Third, enhanced smart tourism is also associated with resilience, which arises from the more responsible management paradigm it promotes, as well as the innovation fostered by smart tourism initiatives. Finally, enhanced smart tourism changes the tourism industry because the ultimate goals of smart tourism are experience enrichment and value creation, and these require different operational models and broader as well as more flexible perspectives on who the most significant stakeholders are.

2.2 Enhanced Smart Tourism Pillars

The four pillars described in Figure 1 have been referred to in the smart tourism literature as Technology, Sustainability, Accessibility/Mobility, and Innovation/Creativity (Gretzel et al., 2018). Enhanced smart tourism suggests that these pillars need to be strengthened and widened to accommodate the new post-pandemic reality.

The first pillar encompasses connectivity, big data analytics, real-time monitoring, phygital experiences, mobile payment, and blockchain technology. In enhanced smart tourism, artificial intelligence plays a significant role in facilitating the realization of these technological building blocks. Through the second pillar, the enhanced smart tourism framework emphasizes the significance of sustainability, covering aspects such as energy conservation, alternative transportation, tourism taxation, sustainable events, and heritage preservation. The third pillar, accessibility/mobility, aims to facilitate tourism for all by enhancing on-site mobility, managing tourist flows, and improving the accessibility of information through open data. Lastly, the innovation/creativity aspect focuses on the establishment of living labs and creative hubs to foster idea creation and sharing.

The *technology* pillar involves broad perspectives on technology that extend beyond the isolated tourism opportunities currently realized by the industry. Smart tourism technology is primarily about connectivity but enhanced 'smartness' comes from the analytical capabilities underpinning smart tourism. Additionally, it involves real-time monitoring and the integration of physical and digital aspects,

making phygital experiences a critical component of smart tourism. Furthermore, the concept of interconnecting tourism with other industries is central to the smart tourism paradigm. For example, mobile payment is one of the ways in which smart tourism branches out into the digital business ecosystem and connects with players that are maybe not traditionally recognized as part of the tourism industry. Related to that is also blockchain technology, like cryptocurrencies, but also digital ledgers and all the opportunities that blockchains can really offer to the industry. Hence, much of this technology needs to be applied at the destination level, which requires coordination among various stakeholders in the enhanced smart tourism ecosystem. Consequently, technology within the enhanced smart tourism context is far more extensive than merely adopting a single device or a single application or realizing a single technology implementation opportunity.

The *sustainability* pillar is connected to technology as well since a lot of this technology enables reevaluating resource usage and facilitating resource conservation. This pertains to various aspects, such as energy conservation and exploring alternative transportation methods within destinations. More generally, it prompts the tourism industry and governing bodies to consider how technology can help with issues like tourism taxation and how to extract value from tourism activity that benefits the society that actually puts on and often pays for tourism. Technology also facilitates sustainable events through lots of opportunities for tracking and for waste management. Furthermore, there is a substantial focus on heritage preservation, enhancing heritage accessibility, and potentially amplifying the voices of marginalized groups not typically represented in conventional heritage presentations.

Regarding *accessibility and mobility*, enhanced smart tourism widens the scope of their meaning to include various flows within the smart tourism ecosystem. On one hand, this involves the practical management of tourist movements within a destination, seeking more effective strategies for managing them. Simultaneously, it also means the increased accessibility of tourism for traveler groups who may have been excluded from tourism in the past. Further, accessibility and mobility also apply to the movements of tourism employees. Last but not least, this pillar also addresses the accessibility of information and highlights the open data movement that plays a pivotal role in the realm of enhanced smart tourism.

The fourth pillar, *innovation and creativity*, serves as a unifying element, focusing on developing skills and knowledge, but also fostering creativity at a destination. It also aims to bring people, companies, and opportunities together to discuss how enhanced smart tourism promotes paradigmatic shifts. Living labs are a notable example that has been explored a lot in the smart tourism context. Enhanced smart tourism also promotes the notion of 'more-than-human innovation' by acknowledging the increasing role artificial intelligence will play in enhancing human brainstorming and design capabilities.

2.3 Responsible Enhanced Smart Tourism Agenda

The potential impacts of enhanced smart tourism on the tourism industry in the near future may be found in its capacity to merge technology and governance and emphasizing sustainability in a broad sense. Sustainability extends beyond environmental concerns and encompasses the protection of various species, heritage preservation, inclusion of marginalized groups, consideration of well-being and health, as well as community well-being. In this context, it becomes essential to ponder: enhanced smart tourism, for whom, and for what purpose? Developing models of "good governance" and committing to justice in the context of smart tourism (Gretzel & Jamal, 2020) constitutes not only a moral obligation but also promises more resilience and

greater competitive advantages. The critical importance of integrating a responsibility agenda when developing enhanced smart tourism needs to be emphasized. This involves a continuous focus on how technology and governance can work together to shape a more promising future for tourism destinations.

2.4 Desired Outputs of Enhanced Smart Tourism

An enhanced smart tourism development framework can be proposed by adopting the smart city development framework based on Yigitcanlar et al. (2018) and the smart tourism development framework by Gretzel (2021) (see <Figure 2>). This framework recognizes city assets as *inputs*, policy, technology and community as *process* playing pivotal roles in driving the development and management of these assets, and four types of development as *outcomes*: (1) productivity and innovation (economic development); (2) livability and well-being (socio-cultural development); (3) sustainability and accessibility (spatial development); and (4) governance and planning (institutional development).

From the tourism industry's perspective, productivity, innovation and competitiveness have been highlighted, and these have been longstanding focal points. However, Gretzel (2021) emphasized the necessity of focusing on the 'output' of smart tourism and considering what the *desired* results of smart tourism are, and who has the authority to determine them. Gretzel (2021) also suggested the inclusion of elements related to livability and well-being, sustainability, accessibility, as well as governance and forward-thinking planning within the realm of tourism. According to Gretzel (2021), achieving these outcomes involves the utilization of technology and the integration of diverse communities while implementing policies that guide our actions effectively. The integration of these elements into a comprehensive approach serves as the driving force for enhanced smart tourism.

2.5 Convergence of Touristic and Residential Experiences Through Enhanced Smart Tourism

Researchers have long been emphasizing the idea that smart tourism is not disconnected from the broader world, the place, government, or other industries (Gretzel et al., 2015; Gretzel & Koo, 2021). They have highlighted that a crucial consideration for the future of smart tourism is to challenge the disconnect between

smart tourism efforts and broad smart development efforts. In the context of smart cities, smart regions, or Industry 4.0, tourism has, in many ways, been isolated from important discussions. Moreover, there is a significant gap in practical implementation within the industry between smart tourism and other smart development initiatives. Much of the city's infrastructure and services have been designed with residents in mind, often making them impractical for tourists. Conversely, many activities and initiatives in smart tourism have frequently overlooked the needs and preferences of local residents. Thus, we need to enhance original smart tourism thinking and extend it to enhanced smart tourism to overcome the divide between smart development and smart tourism.

Gretzel & Koo (2021) noted that everyday life and tourism are increasingly intertwined, and smart technologies are blurring the distinctions between residential areas and tourist zones (see <Figure 3>). They emphasized the need to merge the two notions, namely smart tourism and other smart development efforts, both in the industry and in academia. This involves exploring methods to establish strong connections between these activities to propel smart tourism into an even more prominent role in the future, namely, through enhanced smart tourism.

3. The Significance of Data for Enhanced Smart Tourism

3.1 Smart Tourism Data

From the beginning, the focus of smart tourism has been placed on data. The definition of smart tourism also highlights the role of data in smart tourism ecosystems. Smart tourism is defined as "*Tourism supported by integrated efforts at a destination to collect and aggregate/harness data derived from physical infrastructure, social connections, government/organizational sources and human bodies/minds in combination with the use of advanced technologies to transform that data into on-site experiences and business value-propositions with a clear focus on efficiency, sustainability and experience enrichment*" (Gretzel et al., 2015, p. 181). According to Figure 4, data plays a critical role in fueling the various facets of smart tourism, encompassing the smart destination, governance, businesses, the industry and the enhancement of smart experiences. That is, smart tourism is deeply concerned with data – how to gather it, process it, and transform it to effect real changes across these components.

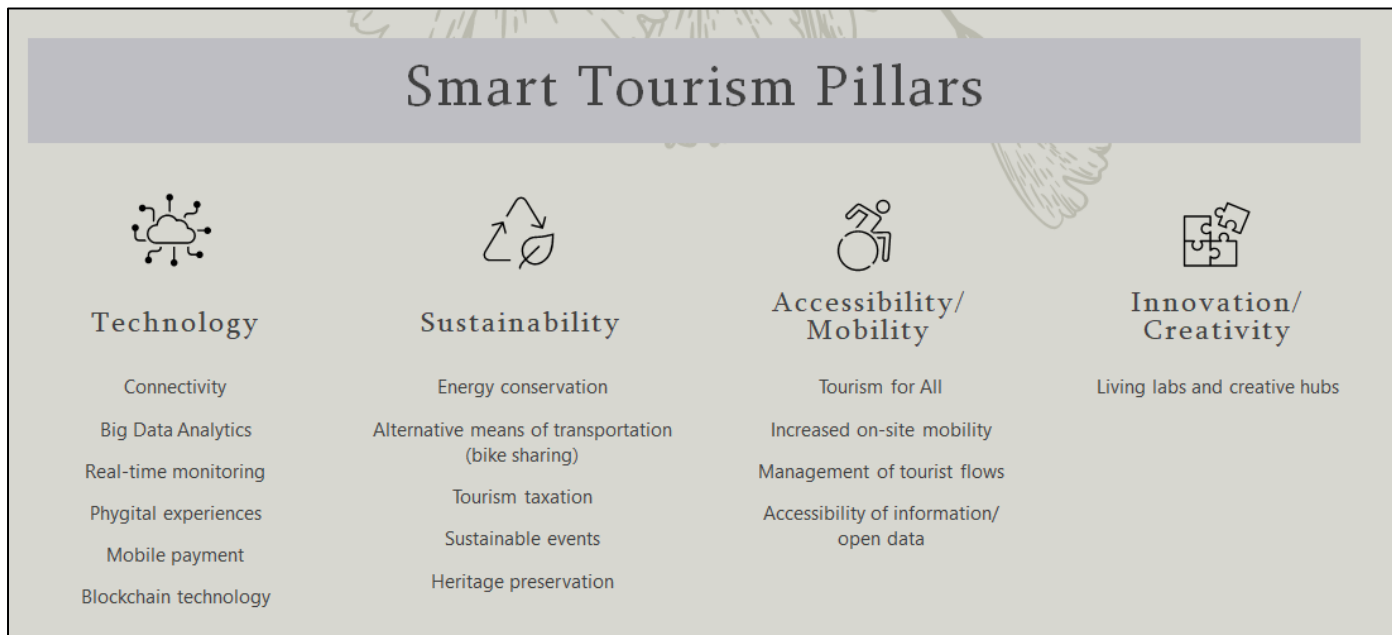


Fig. 1. Four pillars of enhanced smart tourism

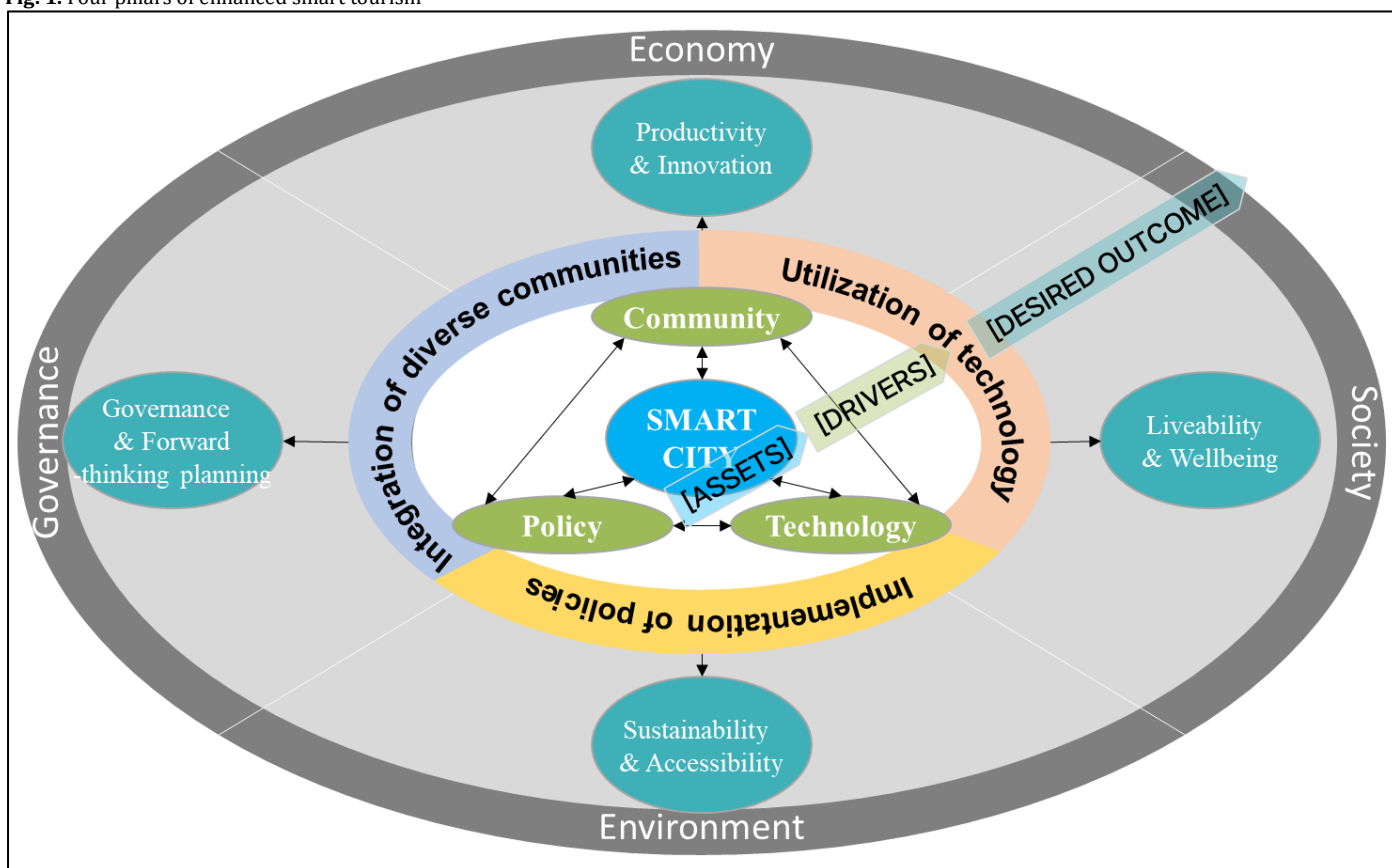


Fig. 2. Enhanced smart development framework (based on Yigitcanlar et al., 2018; Gretzel, 2021)

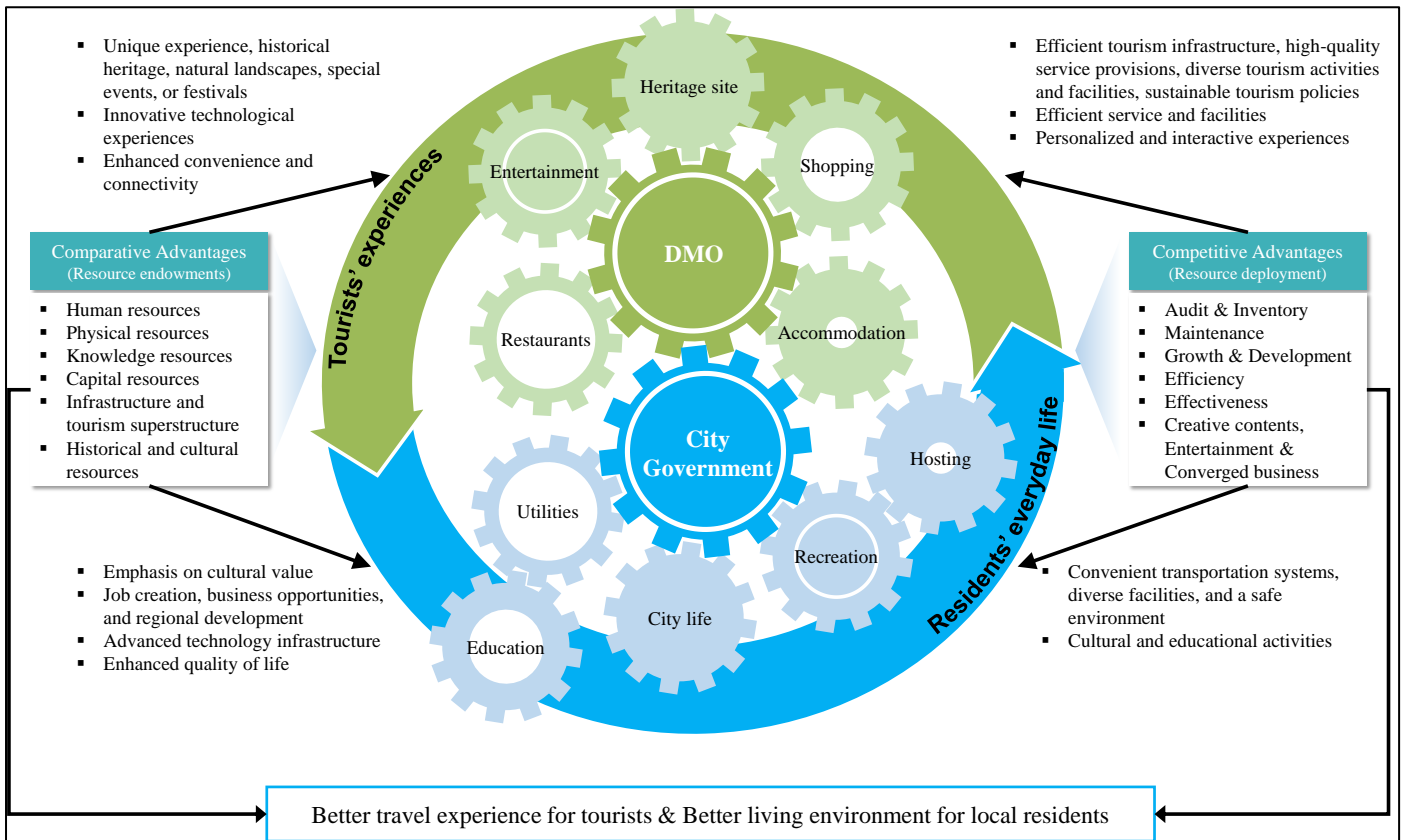


Fig. 3. Conceptual model of smart tourism cities (Gretzel et al., 2015; Gretzel & Koo, 2021)

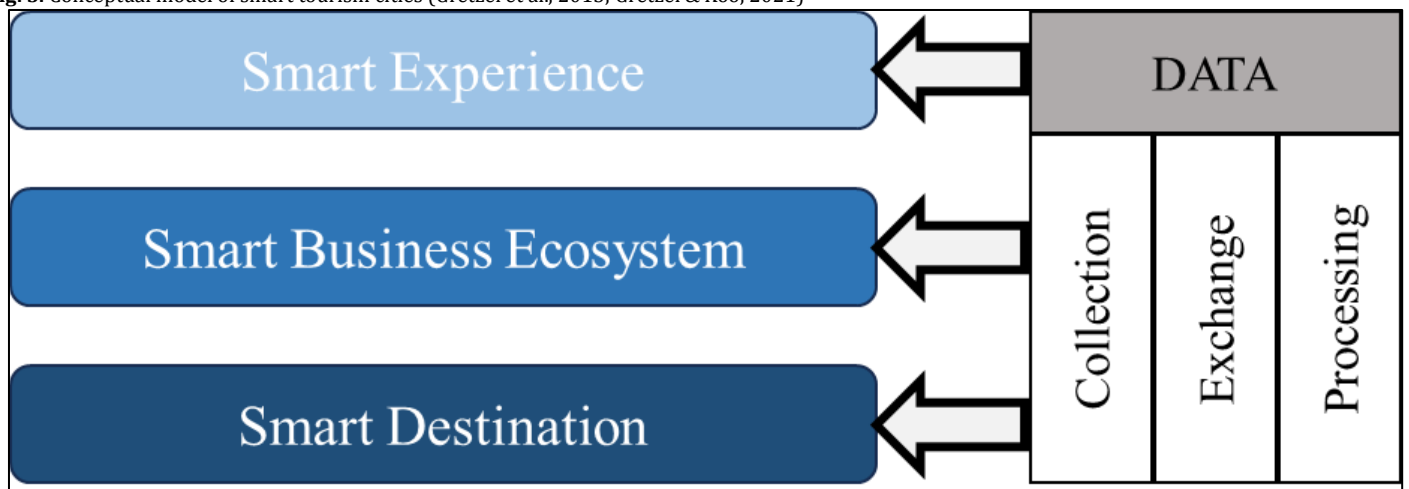


Fig. 4. Components and layers of smart tourism (Gretzel et al., 2015)

The arrows in Figure 4 illustrate the flow of data through the different layers of the smart tourism city (Gretzel et al., 2018; Koo et al., 2023). In a smart tourism city, the physical layer and the technology layer are interconnected. This connection allows the generation of data. Then, this data is processed, stored and shared. It feeds into the business layer, and ultimately creates the smart experiences that are so important for achieving the desired outcomes of smart tourism. Then, from that experience layer, more data is derived. These digital traces become data again in the system and feed back into the data layer of smart tourism.

Figure 5 builds on the original smart tourism data flows but illustrates that enhanced smart tourism adds complexity as well as opportunities for data creation, data valorization, data sharing, data management, data governance, and data-based value creation. In this context, Metaverse technologies not only use the data to create enhanced experiences but also allow smart tourism players to visualize, interact with, and comprehend data in new ways.

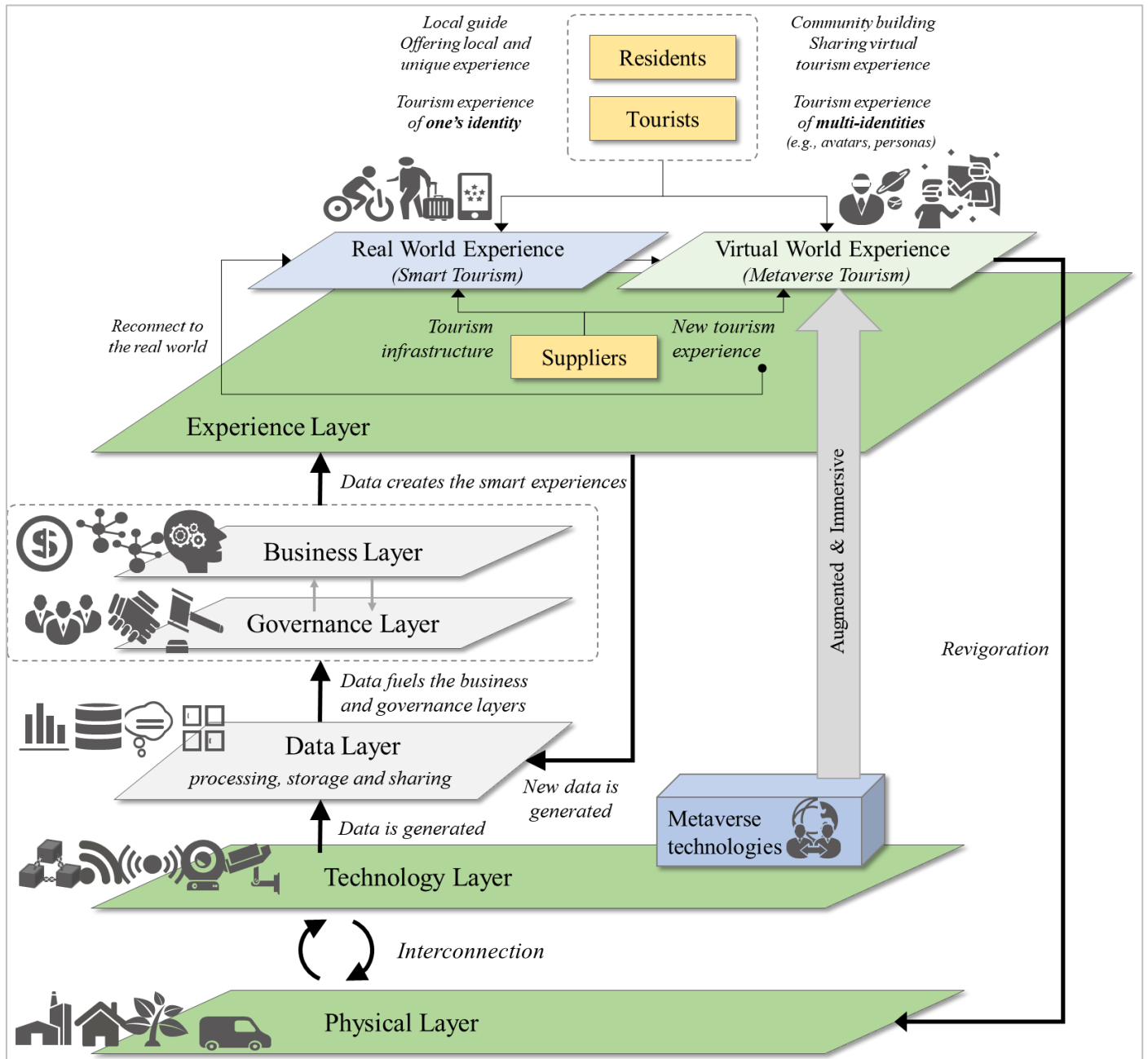


Fig. 5. Data flow of enhanced smart tourism and Metaverse tourism (Gretzel et al., 2018; Koo et al., 2023)

The role of Artificial Intelligence (AI) is crucial in the smart tourism context in relation to data. Specifically, its roles include (1) data management, necessary for managing the enormous amounts of data produced by smart tourism ecosystems; (2) data processing/analysis, required for processing and analyzing data in a way that supports ‘smartness’; (3) data transformation/visualization, essential for converting data into information and structuring it for visualization; and (4) data interaction, needed to interact with data and support interactions that generate data. Regarding the fourth role, the framework particularly emphasizes the data interaction capabilities of generative AI like ChatGPT. As ChatGPT provides data to individuals and utilizes data for learning and personalization, it can offer significant opportunities for participants in a smart tourism system to leverage data. In conclusion, it underscores the symbiotic relationship between AI and data. Practically, AI is highly data-hungry and capable of handling vast amounts of data. Smart tourism generates substantial data, leading to the current problem of data overload, where unused data is stored somewhere. Therefore, looking ahead to enhanced smart tourism,

we must acknowledge that this can only be achieved with the assistance of AI. It is a crucial moment to recognize the indispensability of AI and contemplate its role in the context of enhancing smart tourism in a way that makes it suitable for post-pandemic realities.

3.2 Value of Data

In the enhanced smart tourism context, both industry and academia need to give serious consideration to the value of data. While data has always been central to conceptualizations of smart tourism, its value is usually not formalized. In contrast, data valuation is an integral part of enhanced smart tourism. In this regard, the following dimensions of data management warrant heightened attention in the context of enhanced smart tourism, namely data as: (1) asset; (2) cost; (3) risk; and (4) responsibility.

- **Data = Asset:** The perspective here is that to truly unlock the potential of smart tourism, data should be considered as an

asset. Some stakeholders in smart tourism view data as a significant core asset but simultaneously exhibit hesitancy to share it with others or a tendency to assert ownership over the data. This can lead to issues related to data sharing and result in the phenomenon of excessive data collection and storage, known as data hoarding. Furthermore, the phenomenon of data silos, where data is isolated in one place, can also be seen as a hindrance to the realization of the smart tourism ecosystem.

- **Data = Cost:** Another important perspective involves considering data from a cost standpoint. To establish a sustainable and responsible smart tourism ecosystem, it is crucial to consider costs, methods of cost sharing and distribution, and ways to reduce costs. Data costs can be divided into (1) the cost of generation/acquisition; (2) the cost of storage; (3) the cost of maintenance and accounting; and (4) the opportunity cost of non-use, and all four costs should be taken into account. Specifically, there are costs associated not only with acquiring or generating data, such as the installation of technologies like sensors, but also with data storage. In practice, physical server space is required, and maintaining this storage space consumes a significant amount of energy. These maintenance costs encompass not only storage costs but also ensuring data security and conducting data accounting. Additionally, the opportunity cost of not using data should be taken into account. Therefore, recognizing the hidden costs and opportunity costs of data generation, storage, and maintenance is crucial for the advancement of smart tourism, and careful consideration of these factors is warranted.
- **Data = Risk:** Considering the value of data involves contemplating the risks stemming from data loss. Data loss can give rise to various risks related to data privacy. For example, security alerts associated with hacking attacks and unauthorized data access are common issues we may experience daily. Additionally, there is a need to consider the risk of making decisions based on outdated or no longer valuable data in connection with the data shelf life. For instance, in the context of the COVID-19 pandemic, data from the pre-pandemic era may not sufficiently explain the changes in our lives that we currently experience. Lastly, it is important to recognize that data represents power, implying that some individuals with access to data potentially possess power that they can abuse.
- **Data = Responsibility:** Considering the three perspectives mentioned earlier, data implies responsibility. Enhanced smart tourism particularly stresses that, concerning responsibility, the utilization and control of algorithms by companies can be a significant point of discussion. The algorithms employed by companies often evolve into self-contained systems. Consequently, companies tend to overlook issues arising from intentional or unintentional failures in controlling algorithms. Also, AI creates power imbalances that favor big platforms and make smaller players in the smart business ecosystem more vulnerable (Kozinets & Gretzel, 2021). Therefore, from a smart tourism perspective, there is a need to recognize the importance of responsibility for everything that could potentially arise due to AI. Enhanced smart tourism therefore requires contemplation of the ethics of AI and needs to consider adopting comprehensive AI governance frameworks (Werthner, 2022).

4. Data Valuation Frameworks and Methods

4.1 Lessons from Infonomics

Given the significance of data for enhanced smart tourism, more

emphasis on conceptualizing the value and role of data is needed. Insights from 'Infonomics' (Laney, 2017) can help address issues related to enhanced smart tourism data management. This perspective emphasizes the need for an approach to measure, manage, and monetize data, starting with assigning economic value to data. Specifically, considerations about the quality and value of data, the entities managing the data, and potential barriers to data access are necessary. Then, the next step involves contemplating how to justify the costs of holding this data. In essence, this perspective can be understood as an attempt to find practical guidelines for data management to realize enhanced smart tourism.

4.2 Data Valuation Frameworks and Methods

The discussion on data valuation in the tourism field is currently lacking. In response to this, this paper proposes frameworks and methods for data valuation, emphasizing the necessity of their applicability in the context of enhanced smart tourism. The most commonly used data valuation frameworks are: (1) the 3Vs framework; (2) the information value framework; and (3) the infonomics framework (see also Fleckenstein et al., 2023).

- **3Vs framework:** This framework considers three key dimensions of data, including volume, velocity, and variety. It means that valuable data sets are those that are larger, faster, and more diverse.
- **Information value framework:** This framework considers the informational value of data, which is determined by the quality, relevance, and timeliness of the data. In other words, data sets that are more accurate, relevant, and timely are more valuable.
- **Infonomics framework:** This framework considers the economic value of data, which is determined by the benefits that the data can generate. In other words, data sets that can generate more revenue, reduce costs, or improve decision-making are more valuable.

Furthermore, three data valuation methods are proposed: (1) cost-based valuation; (2) market-based valuation; and (3) income-based valuation.

- **Cost-based valuation:** This method values data based on the cost of collecting, storing, and maintaining it.
- **Market-based valuation:** This method values data based on the price that similar data sets have sold for in the market.
- **Income-based valuation:** This method values data based on the income that it is expected to generate.

In conclusion, there is an urgent need to develop a comprehensive data valuation framework that considers the complexity and intricacies of the enhanced smart tourism context. This requires contemplating what tourism data value means and how it can be established and measured in the context of enhanced smart tourism. Additionally, building on the importance of enhanced smart tourism systems and ecosystems (see also Koo et al., 2016), there is a necessity for data sharing and utilization within smart tourism systems as a means to enhance the value of data. In the context of combining various datasets to increase data value, innovative approaches to data compatibility and how to achieve it in the enhanced smart tourism environment should be considered. Moreover, there is a current need to develop strategies to reduce data costs and risks in smart tourism and recognize the importance of data ethics. To summarize, the value of data for enhanced smart tourism should be considered from the perspective of a data ecosystem, and there is a necessity to share responsibility within these enhanced smart tourism data ecosystems for generating, managing, maintaining, as well as for

using and transforming smart tourism data. As indicated in Figure 6, this emphasizes the significant roles of various stakeholders in handling smart tourism data within the smart tourism ecosystem.

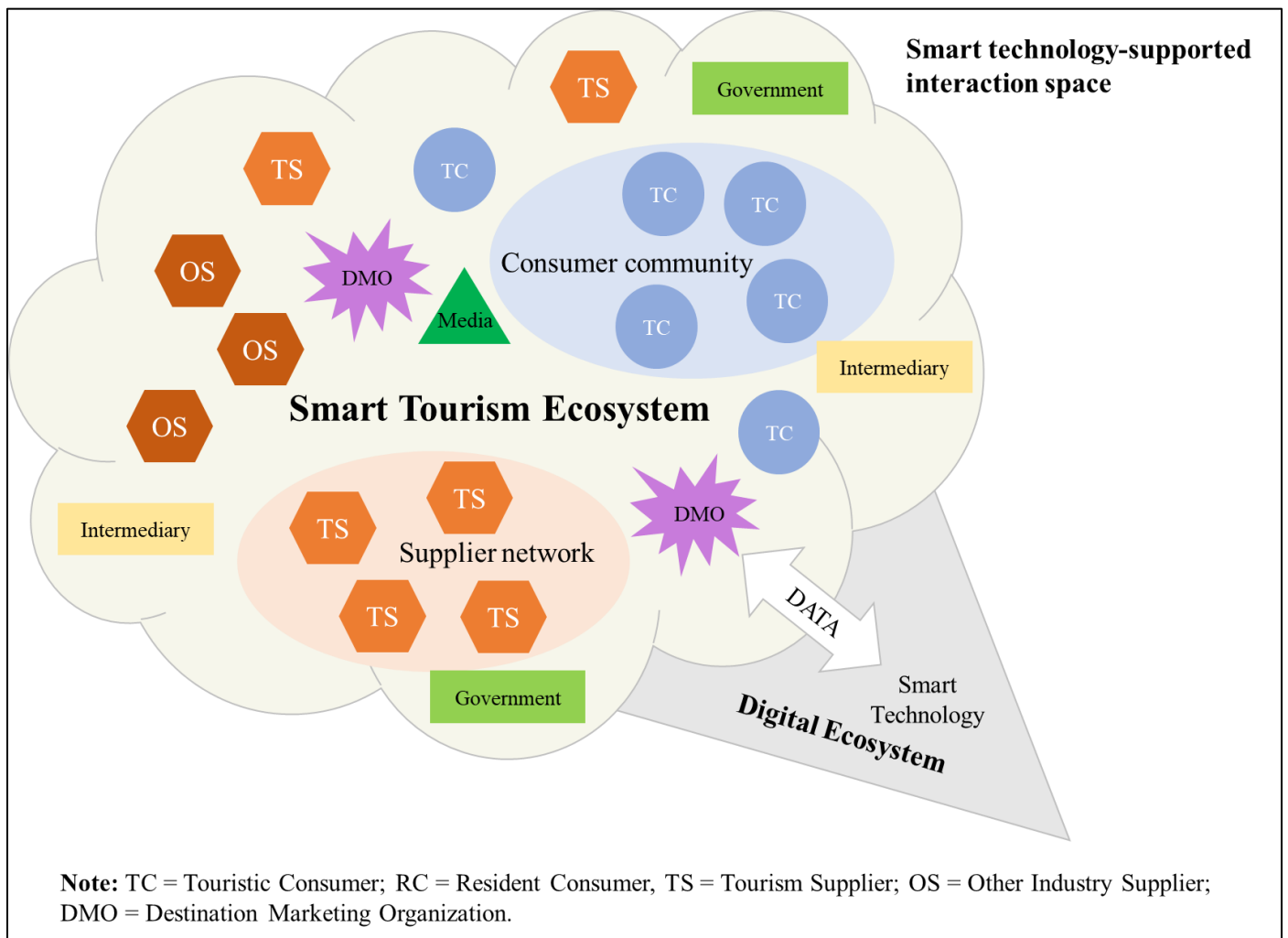


Fig. 6. Smart tourism ecosystem (Gretzel et al., 2015)

5. Conclusion

As tourism emerges from the COVID-19 pandemic and enters its post-pandemic phase, new challenges as well as opportunities emerge. Addressing and harnessing these requires paradigm shifts. This paper proposed enhanced smart tourism as a framework to help guide the necessary transformations. It highlighted that enhanced smart tourism requires thinking beyond technology to put processes, mechanisms and governance principles in place that can ensure the achievement of broader objectives. While some impetus was given as to what guidance will be needed, the details of the enhanced smart tourism framework will have to be further developed through empirical and conceptual research.





Declaration of competing interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Acknowledgements

This paper was supported by the Ministry of Education of the Republic of Korea, the National Research Foundation of Korea (NRF-2019S1A3A2098438)

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