EU guide on data for tourism destinations

SMART TOURISM DESTINATIONS

European Commission

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Smart Tourism Destinations

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Why this EU guide

All over the world tourism destinations are continuously investing and developing new strategies to increase their appeal towards prospect visitors and better manage tourism flows. To this end, many destination management organisations (DMOs) decided to pursue the status of smart destination, by fostering innovation and the uptake of data-driven solutions to enhance their own and local stakeholders offer and business structure, developing new and more sustainable forms of tourism, while broadening their approach to 'destination management'. The latter has been often done by creating synergies with wider 'smart city' programmes – e.g., by sharing technologies initially used for mobility purposes only, adapting them also to tourism-specific purposes and generating economies of scale – or by establishing long-term partnerships with the private sector.

In this sense, the 2020 pandemic outbreak marked an acceleration in the process of digitalisation and in the generation of new ideas and initiatives, often based on smart data management. The necessity to support businesses and ensure administrative and operative continuity by swiftly adopting digital solutions and data-driven approaches emerged in nearly any sector and industry, and the tourism one was no exception. Consequently, an ever-growing number of destinations virtuously starting their journey towards smart tourism can be observed today, both in Europe and abroad.

The following pages contain key information on the main aspects related to the implementation of smart tourism solutions based on enhanced data mastering. The purpose is to share crucial knowledge and understanding from current tourism mega-trends observed worldwide and types of data produced in the tourism ecosystem, to challenges in the implementation of data-driven approaches for tourism management. The document also includes a number of practical and actionable suggestions, based on smart tourism best practices, taking into consideration also the developments and challenges generated by the 2020 pandemic.

This guide on data for tourism destinations might therefore result useful for any type of destination willing to improve the way they collect and use data for tourism purposes and hopefully become inspirational for those cities, regions, or countries, eager to start their journey towards becoming smart tourism destinations.

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About the project

The 'Smart Tourism Destinations' project (Service Contract SI2.843962, 2021-2023) is funded by the European Commission – Directorate General for Internal Market, Industry, Entrepreneurship and SMEs (DG GROW) and managed by PwC EU Services, Intellera Consulting, CARSA and the University of Málaga. The objective of the project is to support EU destinations in their path toward a green and digital transition aimed at improving smart and sustainable management of tourism in the EU through data mastering, understood as the ability to collect, analyse and re-use touristic data in accordance with a coherent strategic plan.

The concept of Smart Tourism

The concept of smart tourism destination

A smart tourism destination is defined as a destination where different stakeholders, eventually under the coordination of a Destination Management Organisation, facilitate access to tourism and hospitality products, services, spaces, and experiences through ICT-based innovative solutions, making tourism sustainable and accessible, and fully leveraging their cultural heritage and creativity. This entails addressing and improving local populations' quality of life, as they benefit from a sustainable socio-economic development and are actively involved in the digital culture fostered in the area.

The idea of smart tourism is an offspring of the concept of smart city. A smart city is characterised by a pervasive presence and massive use of information technologies to achieve resource optimisation, effective and fair governance, sustainability, and quality of life, with applications in a variety of fields such as mobility, living, people, governance, economy, and environment. This smart approach is being applied also to tourism destinations. Indeed, considering the importance of tourism in both urban and rural contexts, the complementarity between services for tourists and residents, as well as the potential of emerging technologies for the tourism ecosystem, smart solutions have been widely introduced in the tourism sector.

According to the European Commission, smart tourism "responds to new challenges and demands in a fast-changing sector, including the evolution of digital tools, products and services, equal opportunity and access for all visitors, sustainable development of the local area, and support to creative industries, local talent and heritage".

Key definitions

Tourism data management

Ability to collect, curate and re-use touristic data in accordance with a coherent strategic plan. The goal is to help people and organizations in making decisions and taking actions that maximise the benefit to the organization.

Travel intelligence

Integration of global and current data analytics to inform the decision making process for the tourism sector. The purpose is to reduce uncertainty by using information obtained from a many data sources, even in real time.

Destination Management Organisation (DMO)

Organisation which coordinates the many constituent elements of the tourism ecosystem; contributing to the destination development considering residents and stakeholders interests and wellbeing. The DMO may provide visitor services and the necessary information structure to market the destination in a most democratic way.

Tourism sustainability

The ability of a tourism ecosystem of preserving its natural and cultural resources, promoting the wellbeing of local communities, mitigating the seasonality of demand, limiting the environmental impact of tourism-related activities, supporting accessibility and improving the quality of tourism jobs.

Tourism accessibility

The ability of tourism and travel to be accessible to all people, irrespectively of age, social conditions or of any type of disability – temporary or permanent. Includes accessibility in the physical environment, in transportation, information and communications and other facilities and services.

Tourism ecosystems

The range of stakeholders involved in the tourism sector. It includes not only public administration and private businesses, but also innovation labs/hubs, universities and research centres, innovation accelerators/incubators and local inhabitants.

Open Data

Information collected, produced or paid for by the public bodies and made freely available for re-use for any purpose. It is built around the key pillars of the internal market: free flow of data, transparency and fair competition.

Smart environments

Smart environments use ambient technologies (sensors, telecoms networks, IoT and AIs) to provide sustainable resource efficiencies and new insights into operations from complex data to firms and their stakeholders.

Main trends in the tourism sector

Three megatrends to predict the evolution of data use for tourism

Smart destinations are continuously evolving in their provision of services to tourists, following socio-demographic, cultural, technological, environmental and political changes that affect all areas of society. Being aware of and understanding these developments in the tourism sector is key to plan tourism development strategies, especially in the attempt of adopting smart tourism approaches which require not only investment in technologies but also cultural changes in DMO and across the entire tourism ecosystem so to allow the transition from 3S tourism ("sea, sun, and sand") to 3E tourism ("education, entertainment, and experience").

Different types of trends can be observed and foreseen in the tourism sector occurring in or across different timeframes, corresponding to short-term (until 2024), medium-term (until 2030), and long-term (2050). Such trends can be grouped in three mega-trends categories presented below and namely:

- Technological progress
- Socio-demographic changes
- Sustainable development and environmental neutrality

Changes in the political and regulatory landscape are transversal to these three categories and also need to be closely considered.

Main trends impacting the tourism sector

Socio-demographic changes

An **ageing population** and progressively **higher rates of digital literacy** represent two defining demographic trends with direct implications for the tourism sector.

- Propensity to remain connected
- Changes in the purchasing process
- Digital natives to become the main consumers of smart tourism
- Boost in lifelong learning
- Ageing population

Technological progress

The growth of connectivity and distributed infrastructures are making **digital transformation increasingly accessible and capillary**. **Data represent the key fuel** for most of these forces.

- Big Data
- Recommender Systems
- Cloud computing
- Augmented Reality
- Artificial Intelligence
- Sensors and evolution in IoT
- Cybersecurity and blockchain
- Metaverse
- Robotics for tourism

Sustainable development

Already occurring before the COVID-19 crisis, these forces are expected to drive change towards a **more inclusive, economically and environmentally sustainable economy**.

- Responsible Tourism
- Increasing sharing economy
- Accessible and Inclusive tourism
- New business models and regenerative tourism

Main trends in the tourism sector

Megatrend 1 – Technological progress

Digital transformation at different speeds is already taking place in the European tourism sector and the growth of connectivity and distributed infrastructures are making such transformation increasingly accessible and capillary. As organisations have different readiness levels and needs, trends in technological progress open different opportunities for each destination. Cloud-based and Big Data solutions for travel intelligence and to inform (predictive) decision-making are already widely diffused, also supported by the ever-growing quantity of sensors deployed on destinations territory, often in the context of smart city-related solutions. At the same time, other solutions are becoming increasingly mature and ready for the go-to-market also for tourism purposes in the next decade. Augmented reality applications, enhanced data sharing infrastructures such as data spaces, and blockchain based certification systems are examples of such solutions. Finally, there is a significant momentum in R&D investments by leading technological players in the field of the metaverse, promising interesting applications for the tourism sector once it will become mature.

In this context, on the short run, it can be observed that 5G and 6G mobile networks will play a pivotal role in addressing the growing demand for speed, coverage and quality of networks as well as to support big data and cloud-based solutions, fed by a growing number of datasets generated by sensors and IoT applications. Big data solutions are already in use in several destinations to support decision-making and this centrality is expected to increase, also in light of growing awareness of the benefits of data sharing and the adoption of common standards. Destinations, on the short term, will also have to widen their ability to process data collected through voluntary data capture and recommendation systems. Such data - generally collected through online forms or beacons communicating with tourism apps - is crucial to design predictive and behavioural models based on user profiles as well as to make personalised recommendations.

On the medium term, evolutions of current technologies combined with the structural adoption of new technologies that are now reaching the necessary maturity stage, will make smart tourism increasingly possible and accessible for both DMOs and end-users. Internet of Things (IoT), for instance, will reach a new stage of development, not only because of the cost of sensors, devices and related software is progressively decreasing, but also because of the higher complementarity and interoperability of the systems involved. In this context, increased data interoperability, coupled with improved data privacy and security, will foster widespread data sharing and re-use. Cybersecurity will become increasingly important for both destinations and users and technology solutions providers will need to adapt to new regulatory constraints and guidelines. At the same time, further development in machine learning and neural networks are expected to unlock the potential of other technologies also in the tourism sector. An example of this is Augmented Reality (AR), currently mostly limited to the gaming sector, but with huge possible applications also in the tourism industry, to offer increasingly immersive and dynamic experiences.

On the long term, the parallel development of data interoperability, AI-powered solutions and big data processing capabilities, will allow to increasingly make the tourism management accurate and efficient and tourism experiences seamless and personalized. Blockchain-based solutions have the potential to increase the security and transparency of data and information systems. The metaverse will offer opportunities for immersive education and entertainment experiences. Improved data security systems coupled with a more advanced and encompassing regulatory framework are going to support the widespread embedding of biometrics and recognition systems into tourists' life. Developments in robotics – combined with AI for autonomous movement or language processing – are also expected to produce some impact in the tourism services and hospitality sector. On a long time-horizon concierge and reception tasks could be executed by chatbots and robots, as well as assistance to e.g., tourists with limited mobility could be provided through robots or autonomous vehicle systems.

Main trends in the tourism sector

Megatrend 2 - Socio-demographic changes

An ageing population and progressively higher rates of digital literacy represent two defining demographic trends for the next 30 years. Regarding ageing populations, the share of older individuals in the total global population is expected to increase significantly in the coming decades. These trends need to be taken into account both from the perspective of target tourists and labour market. For example, the five primary generations alive today are the Baby Boomers, born in the period 1946-1964; Generation X, born in the period 1965-1980; Millennials, born in the period 1981-1996; and finally, Generation Z, which includes the individuals born in the period 1997-2012.

The 'Baby Boom' generation will become the oldest target group in the coming decades, with the highest spending capability, but average lower digital skills in comparison to other tourists. They will progressively require a set of personalised touristic services based on a combination of health and cultural tourism, in line with both their health necessities and cultural habits.

Generations Z and Y will become young adults before 2050, with lower spending capability than their parents. For what concerns digital literacy, however, individuals belonging to these generations will be fully engaged with digital technologies throughout their lives. Millennials, who are collectively considered "digital natives", will become the main smart tourism consumers, but more in need of low spending solutions. The purchasing process of touristic products and services is also changing, as more and more individuals are using online services rather than travel agencies. These generations will also represent the new employees, bringing new competences that will need to be attracted through digital recruitment strategies.

As a consequence, in terms of socio-demographic trends, on the short term there will be a growing propensity and need to remain 'connected' and consume digital services and products. This is going to take place despite an average ageing population of non-digital native individuals. Lifelong learning for developing and constantly upgrading skills also in less digital-confident population segments is certainly an aspect favouring this trend and to be followed closely.

On the medium-term, more impacting changes will start to be observed, mostly driven by digital natives becoming one of the main tourist segments. Their growth, combined by digitally savvy individuals of Generations Z and Y will entail a behavioural shift with demands of more inclusive and interconnected virtual services as well as structural changes in the purchasing process of tourism services, increasingly 'modular' and customisable.

On the long term, digital native individuals, such as millennials and alpha generation, are becoming the main smart tourism consumers, pushing even further the need for a smarter and digital tourism offering. Generation Y and in particular generation X will become older adults with accompanying requests of smart tourist services that combine both 'healthy' and cultural tourism.

Megatrend 3 - Sustainable development and environmental neutrality

Sustainability and environmental neutrality are becoming central also in the tourism sector. Tourists are increasingly aware and careful when it comes to the impacts of their choices. Likewise, DMOs, businesses and even big tourism sector companies are developing more inclusive, responsible, and environmentally neutral social innovations for both residents and tourists. This touches not only aspects related to the environment and the preservation of heritage sites, but also pertaining to the preservation of local historical businesses and economic activities, and the regeneration of territories and resources.

In this context, new business models will enter into the tourism market with force, taking full advantage of new information and communication technologies. The overall trend will be an easing in the end-users' exchange of products and services outside the traditional models by creating peer-to-peer relationships. This trend has its root in the continuous growth of internet accessibility and connectivity, a phenomenon which increased its speed after the 2020 pandemic outbreak. Many well-established tourism-related business models were revolutionized by digitalization. This trend will continue in many areas, from mobility, to accommodation booking and sharing and to holiday rental. This will require further legislative and regulatory efforts as well as the review of current quality control frameworks and taxation schemes.

In the medium term, digital nomads and free lancers will represent a significant share of the consumers' market for touristic services. This market segment will most probably seek low fare and functional accommodations and services, allowing to seamlessly perform professional activities and make the most out of the extra-work time. A powerful digital connectivity and efficient mobility therefore emerge as key aspects of this type of tourism offering and which will also have to value the relation with residents. As it is already taking place in some smart destinations, new tourists are more willing to be engaged with the locals, to enjoy 'authentic' experiences less environmentally impactful and fostering the regeneration of local tradition and intangible cultural heritage. Successful smart tourism destinations will be able to attract responsible tourists with the promise of having a positive impact, and in turn will strengthen their environmental, cultural, and socio-economic resources thanks to tourism. In the long term, the above trends are expected to evolve into a more inclusive, and sustainable sharing economy, pushed by environmental and economic behaviours and beliefs of millennials and younger generations.

Types of data for tourism

How does tourism make use of data?

The effective and efficient use of data offers a myriad of opportunities to improve tourism services of both destinations and companies. For instance, a destination may use information shared in location-based social media to create personalised marketing campaigns, or a company may use historical data on visits to predict tourist demand and plan operations more effectively.

The cases of smart data use for tourism are growing worldwide both by public authorities and private sector actors. For instance, more and more accommodation booking platforms combine and analyse multiple data types and sources to recommend individual providers the optimal price at which they should rent out their accommodation. This is in line with an overall trend of developing datasets and data analytics models based on data interoperability and standard formats that allow to analyse amounts of data unimaginable even just few years ago, e.g. combining data on accommodation characteristics (size of the, equipment, number of rooms), accommodation environment (number of attractions nearby, distance from the city centre), booking year time and planned events (season, public holidays, festivals, etc.), weather forecasts, availability and pricing of nearby accommodations, and user activity (searches, filtering preferences, ratings, and reviews).

To fully understand the potential of exploiting multiple data sources, a key step is to map the tourism ecosystem, identifying:

- the purpose for which tourism data can be collected and analysed
- all the main stakeholders and possible data users and producers
- the available data types and main data sources that generate the identified datasets.

These three dimensions are the basis to identify possible data flows and high value datasets that often destinations already have at their disposal but are not fully aware of the potential that could be unlocked through their exploitation.

Types of data users

Actors from the entire tourism ecosystem can benefit from the availability and exploitation of tourism data to refine their strategies, optimize their operation and improve their offering, both in the public and in the private sector. Three main types of data user are identified – which can be at the same time also data producers or intermediaries, depending on the nature of their operations and business.

Tourism destinations and public authorities

This category of data user includes a wide variety of different entities, from multilevel public administrations (city councils, municipalities, regional councils, national agencies, etc.) to higher education institutions, researchers, and cultural heritage sites. It has been observed that in some cases, destinations mutualise the effort by establishing partnerships, even cross-border, to collaborate on common projects and strategic initiatives to support the tourism industry. In larger countries presenting regional administrations, these sometimes launch strategies involving the entire regional tourism ecosystem to connect tourists, tourism operators and local authorities.

Private sector - Tourism industry

There is a wide spectrum of private actors specialising in the provision of services for the tourism sector. Most of the companies making use of data are big vacation rental sites and touristic metasearch engines (such as renowned Airbnb, Booking, TripAdvisor, Kayak, Skyscanner) and big hotel groups, as well as actors operating in the MICE industry, the retail industry, the transport industry, and the entertainment industry which do act as relevant stakeholders in tourism. Moreover, a growing number of IT and software companies are offering tourism-specific, data-driven, and data analytics services for travel intelligence and destination management optimisation.

Private sector – Other

Among the types of data users in the tourism ecosystem there are also private companies not directly related to the tourism sector, but capable of acquiring or producing high value data sets was also recorded. These include most importantly telecommunications companies that collect and analyse data from the sim cards of their users as well as social media, in compliance with and within the thresholds set by the GDPR regulation. Data collected by this type of entities, are then usually sold to operators in a variety of sectors - including tourism.

Types of data for tourism

Purpose areas of data use

Purpose areas represent the objective for making use of data. Destinations willing to enhance their data mastering capabilities and identify key high value data sets have to clearly understand to which end data collection and analysis efforts will be performed. In general terms, the wide range of different cases of data use for tourism can be grouped into four main purpose areas.

Improve interaction and engagement with the tourist

The first purpose of data use relates to the development of tourism services **increasingly personalised and based on a higher degree of interaction with the customer/end-user.** This is the result of a generalised trend enabled by new technologies and data analytics techniques that allow for offer optimisation and tailoring on the customer. Tourists nowadays expect more and more personalisation and the possibility to customise their experience. which are becoming parameter for determining their satisfaction as well as for evaluating the perceived quality of the destination.

Conduct market analyses and inform decision-making

The second data purpose area pertains to the **improvements in market analysis and decision-making** linked to higher availability of data and improved data analytics capabilities by tourism destinations. Both private and public actors work as data collectors, but also need data to define their business strategies and manage the destination territory and tourism flows. Public authorities often have information on visitors' interaction with local services – for instance local mobility (e.g., airports, ports, etc.) or data on accesses to heritage sites – while private actors collect large amounts of commercial (purchases on websites or by credit cards) and even behavioural data.

Improve planning and operations of tourism services

Data allowing to better understand (and possibly predict) tourism patterns can also help to **improve the overall efficiency and competitiveness of the tourism ecosystem**, through accurate planning and resource allocation. Increasing the number of tourism data sources that provide relevant insights on tourists' flows and choices can help in timely identifying changes that require re-scheduling of activities (e.g., timing of events, special offers/promotions, free access to museums, etc.), or amendments in the planning of material or human resources deployment (e.g., personnel needed in info points, airports, shops, etc.).

Increase destination sustainability and accessibility

Enhanced analysis and management of data can also improve the relationship between the tourism sector and the environment of the destination, producing positive impacts on society at large. The latter can result, for instance, in better tourism experiences for vulnerable or disadvantaged groups – e.g., developing specific services or making existing services easier to use – as well as in improved management of tourism flows to increase locals' wellbeing or to reduce tourism burdens on urban and natural environment. Improving the overall efficiency of the tourism ecosystem through smart solutions can also improve overall transparency and inclusion of local communities.

Good Practices

Improve planning and operations of tourism services

The Dubrovnik Visitors service enables to monitor the number of people that is currently in the Old Town in the City of Dubrovnik and visitors flows. Based on this information the city authorities can make smarter and more informed decisions.

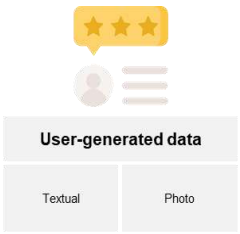
Conduct market analyses and inform decision-making

Through its Tourism Intelligence System (SIT), the city of Valencia offers detailed insights and data on the tourism industry of the city. The SIT is continuously updated and gives both partners and stakeholders an opportunity to optimise their processes and decisions according to the relevant data.

Types of data for tourism

Data types and sources

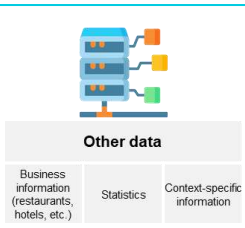
Useful and high value data sets to be combined can come from a multiplicity of sources. From publicly collected data to privately owned ones and to data produced directly by tourists, the spectrum of information that destinations can potentially access to is continuously growing. Moreover, data can be structured or unstructured, thus making their analysis more complex, and dataset can vary considerably in their size. Having a clear picture of all the possible data types and data sources in the tourism ecosystem is crucial to priorities data management efforts and develop winning strategies.



User-generated content (UGC) is data produced made available by tourists themselves or in some cases by local residents. UGC can be divided into two main sub-categories: textual information and photos. Textual information consists of the feedback that tourists share about their experiences, such as reviews, posts, blog articles, or contributions to surveys. On the other hand, photos are usually uploaded by tourists on social media, and come together with a variety of additional information, such as locations, time, and tags. User-generated data gathered through social media interactions, are becoming crucial to intercept and predict tourists' choices and preferences. These platforms make available millions of tourists' reviews and first-hand feedback. and power predictive algorithms.

The rise in cashless payment solutions in multiple areas – from shops to public transports, accommodation, and tourism sites – generates massive amount of tourism-related commercial data. Such data is generated anytime a transaction is performed, including operations and activities that take place in the tourist market also in the pre-visit phase. This source of data is further divided into three sub-categories: data from the web searches and the webpage visits of tourists, data from the online bookings and purchases, and data from consumer cards (including credit cards, reward cards, payment cards, etc.).

The widespread adoption of smart city solutions based on smart monitoring of public spaces through the capillary deployment of devices and sensors, here including satellites, has paved the way for tourism-specific measurement s and data collection. Device data can be divided in two sub-categories: data collected by devices and sensors that allow the tracking of movements (including GPS data, mobile roaming data, Bluetooth data, RFID data, WIFI data and meteorological data), and data collected by smart city devices and sensors, which can be used for broader purposes including tourism management (e.g. data from traffic sensors, air quality, public transportation, internet access, etc.).



High value data can also come from other sources, including private businesses datasets (e.g. data on the number of passengers held by airlines, data on vacancies of hotels, data on restaurants reservations, etc.), statistics (such as the datasets published by public authorities), and context-specific information, namely all the pieces of information regarding a certain destination that can be used for a touristic service (e.g. the information on the history of a place, which can be used to develop a virtual reality experience in which the tourist can explore a destination as it was in the past).

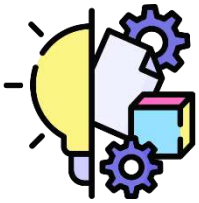
Good Practices

User-generated data

Benidorm Tourism Foundation collects **user-generated data** from 3 sources: "Benilovers", influencers and content creators. This data allows to effectively connect with tourists and to increase users engagement. The content generated has also great value and usefulness for other users.

Other data: Open data

Smart Dublin promotes an **open data culture** providing information on a host of activities across the Region, thus enhancing transparency and accountability to citizens, while also increasing data literacy levels amongst the staff members and supporting evidence-based decision making.



Key challenges in the EU tourism ecosystem

Six key challenges on the path of tourism data mastering

Implementing data-driven approaches at the basis of smart tourism poses several challenges. Such challenges must be known and taken into consideration so to design strategies capable to address them. For 'challenges' it is not meant only aspects pertaining to the purely data-analytics sphere, such as enabling technologies and related infrastructures and data formats, but also normative aspects related to data privacy and data management, as well as 'human' aspects such as digital literacy of tourists and tourism workers or the ability to involve as many stakeholders as possible in data sharing initiatives. Therefore, being aware of the key challenges for data-driven tourism, is crucial for any destination aspiring to successfully master data.

Data itself | **Heterogeneity of tourism data** | **Technology and power** | **Tourist attitude and digital literacy** | **Privacy** | **Human and artificial intelligence** | **Governance**

Key Challenge 1 – Data itself

The main challenges encountered when making use of data for tourism consist of the well-known challenges posed by data itself, regardless of the sector of application. When characterising data – and big data in particular – reference is frequently made to the so-called "Vs":

- Firstly, to be valuable, data needs to have a large **volume**. However, big datasets are usually expensive and require a lot of time to build
- Second, data also needs **velocity**, as it must be quickly generated and processed, processes which are once again highly expensive
- Third, data usually comes from a **variety** of sources and in heterogeneous formats, requiring considerable effort to standardise and harmonise
- Fourth, data requires **veracity**, as it obviously must be reliable, accurate, and meaningful.

Guaranteeing all the different Vs requires specialised competencies and advanced technologies. Within a fragmented industry like tourism – which is mostly based on micro-businesses – the significant investments required to harness data and generate value may be particularly costly and complex to implement.

Key Challenge 2 – Heterogeneity of tourism data

The well-known issues in connection with using (big) data appear to have been encountered also in the framework of recent initiatives aimed at creating tourism platforms and data sharing spaces at international, national, and local levels. These are indeed characterised by an overall lack of interconnection, common formats, standards (e.g., semantic), and interoperability protocols. This limits the full exploitation of the data value to support destination management and sustainable tourism development approaches, as well as the possibility for stakeholders to combine data from different sources and obtain insights to feed into policy and business decision-making processes. The fragmentation of tourism datasets is also one of the key reasons behind the European Commission's recent investments in common European data spaces in various strategic areas, including tourism.

Key Challenge 3 – Technology and power

Another key challenge is that all smart solutions require an ecosystem of information and communication infrastructures, systems, and devices to function. The development of this infostructure requires significant investments on the part of destinations and companies. While these may have already taken place in bigger destinations – where public administrations have usually already funded a number of relevant smart city projects – there is a risk of digital exclusion for smaller destinations. This challenge is closely linked with the issue of access to power: for the infostructure to function, all stakeholders – including destinations, companies, and tourists themselves – have to be ensured constant access to power, which is challenging both in terms of technical feasibility and also in light of sustainability goals.

Key Challenge 4 – Tourist attitude and digital literacy

Smart tourism solutions certainly offer enormous potential to offer more and more personalised and co-created experiences to tourists. At the same time, however, not all tourists may prefer such smart experiences over more traditional ones. Indeed, smart tourism solutions require a high degree of effort to interact and be engaged with and pose the risk of cognitive overload. In other words, in an ever more connected world, tourists may be precisely looking for a window of opportunity to disconnect, unplug and rediscover the authentic through travel.

Key challenges in the EU tourism ecosystem

For this reason, another important challenge consists of ensuring that smart tourism can accommodate for different levels of tourists' eagerness to make use of technologies, and to avoid any negative consequences of ICT on the tourist experience, a phenomenon sometimes referred to as "e-lienation". Similarly, a strong reliance on technology also poses issues when considering that tourists can have different levels of digital literacy, and that therefore tourists without the necessary competencies or devices may risk being left out of particularly smart experiences.

Key Challenge 5 – Privacy

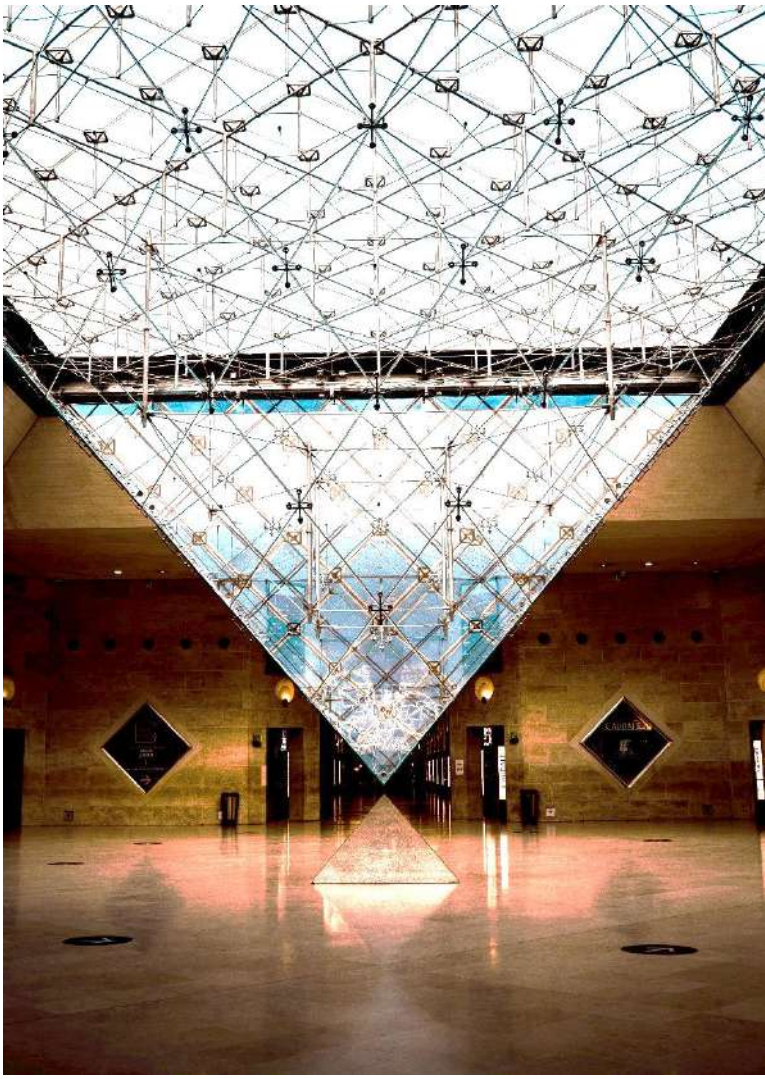
The continuous capture and exploitation of tourists' personal data lies at the core of many smart tourism solutions to enable the creation of enriched experiences. Indeed, personal data allows to tailor tourism services to personal preferences (e.g., suggesting meal options in accordance with dietary requirements), location (e.g., alerting of important landmarks in the vicinity), and time (e.g., suggesting alternative routes based on real-time weather conditions). While caution regarding privacy is certainly on the rise among European citizens, especially after the entry into force of the General Data Protection Regulation (GDPR), tourists tend to be more easily persuaded to share their personal data when compared to people in their usual context of life. For instance, a tourist may yield up her/his data to an application if that comes as a necessary condition to have access to the internet, or a tourist may suspend her/his privacy concerns when using an app that offers an entertaining and interactive experience. The extensive collection and processing of personal data in tourism – combined with the fact that data subjects are frequently unaware of the value of their personal data and are therefore unable to negotiate their exchange – generates significant privacy concerns, especially in connection with the issues of electronic surveillance and profiling for micro-targeting.

Key Challenge 6 – Human and artificial intelligence

Tourism workers are on average less qualified than the overall EU working population, with up to 25% possessing low-level qualifications. The sector is also affected by structural innovation deficiencies, even though ICT is ubiquitous in tourism and that tourism experiences are more and more mediated by smart gadgetry. Due to the COVID-19 pandemic, the skills gap was further worsened, as a large share of employees that could not be hired in 2020 and 2021 moved to other sectors and new workers from other sectors were often not equally qualified. Moreover, the pandemic generated new competencies needs – such as the need to use digital tools for sanitary reasons. In addition to the average low qualification level of the tourism worker, specialised human intelligence is also needed to reap the benefits of technology and data to improve tourism experiences, especially in the form of skilled data experts. The need to attract knowledgeable workers becomes clearer when considering that the technological advances, such as artificial intelligence, are going to unlock an even greater potential from the exploitation of data. Indeed, artificial intelligence is expected to be a particularly disruptive and challenging technology, as it will require significant technological investments, change management actions to address possible adverse attitudes towards AI by tourists and tourism workers, and the already mentioned need to secure the necessary skilled workforce.

Key Challenge 7 – Governance and cooperation

Finally, successful smart tourism strategies leverage the common interests and resources of stakeholders involved, exploiting and creating new synergies. This requires that at least an initial critical mass of stakeholders is aware of the benefits and opportunities of smart tourism, that they trust each other and agree on a mandate, and that they cooperate to build an active and engaged smart tourism ecosystem. Ensuring smooth cooperation, sharing of data, commonality of intents, and definition of responsibilities is a key challenge that DMOs embarking towards smart tourism need to consider.



Getting smart: the path of tourism destinations

How to get ready and become a smart destination?

Destinations willing to embark upon the journey of becoming or improving as smart tourism destinations have to consider the adoption of a multidimensional approach to destination management. Such approach must include the definition of specific strategies and effective governance models, identification of data flows and relevant datasets, strategies aimed at improving the environmental sustainability of destinations themselves, key technologies and infrastructures as well as skills and policies dedicated to the entrepreneurs and businesses of the tourism ecosystem.

Strategy

The preparation of a smart tourism data strategy and related execution plan is a crucial preliminary activity. Defining a clear smart tourism development path helps to detail and to best combine the many elements to be addressed from technology to skills and financial aspects. Moreover, such strategy fosters coherence and continuity in the policy action, against any change in the political and administrative setting that might occur.

The strategy should be tailored on the needs of the destination and therefore drawn upon an initial self-assessment aimed at understanding current strengths and areas for improvement. It is advisable for DMOs or other actors leading the strategy to adopt a participatory approach, inclusive of a multiplicity of stakeholders, from different policy departments in the destination itself, to local businesses, associations and citizens. Once the key goals and objectives are clear, the strategy should identify the best fitting priority high value datasets, which will have to be trusted and accessible, as well as the destination needs in terms of technological infrastructures, resources upskilling, and financial resources.

Moreover, an effective smart destination development strategy has to:

- Clearly identify tourist target groups, who have to be the subject of the creation of personalised value propositions and data driven engagement
- Lead to the structural embedding of data-driven decision making into the entire policy cycle
- Increase the destinations' accessibility and sustainability, taking into account the quality of life of residents.

Governance

The governance of a smart destination has to be set up to both ensure effective data management and foster the establishment of favourable conditions for the embracement of the new solutions adopted.

When it comes to data management, a specific function – department or officer – should be appointed, for the planning and implementation of all smart tourism actions, including the definition of objectives and the measurement of their achievement. This function should possess the skills and the expertise to understand and cope with the technical, commercial, legal, political, and social implications of dealing with data. The creation of an enabling environment requires involving the entire tourism ecosystem to unlock synergies and economies of scale. The range of stakeholders includes not only administration and businesses but also innovation labs/hubs, research centres, and innovation accelerators/incubators. Sectorial sandboxes and public-private partnerships should also be established to address specific issues of the tourism sector, such as the development of common data sharing standards or the integration of different data sources.

Becoming a smart destinations requires a comprehensive approach

Systematic effort should also be devoted to building a data sharing culture among stakeholders that might be supported by targeted policymaking (e.g., encouraging and rewarding B2B and B2G data sharing mechanisms or ensuring priority to privacy and confidentiality rules), with a minimum level of cooperation ensured by regulatory obligations (e.g., open data on specific topics and sectors. Moreover, dissemination and promotion of successful data sharing experiences is also crucial to extend the perimeter of committed and interested stakeholders.

Skills

Embracing a smart tourism paradigm in destination management requires a combination of upskilling and cultural change within the DMO, and more in general across the tourism ecosystem.

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In terms of pure upskilling, data driven, and data-informed policymaking requires to equip current employees with the necessary knowledge and skills to understand how their operations entwine with data mastering activities. Training cycles and info-sessions could be organised, and guidance documents circulated internally. Among these activities, peer learning and webinars held in collaboration with other destinations might be a valuable mean not only of knowledge and skills transfer, but support in the necessary cultural change that employees and officers will have to go through to promote an internal culture of data-driven work.

In addition, different profiles should be included to support the destination with data management and analysis (and visualisation) and possessing specific technical skills. Such profiles could be hired or be object of partnerships with private or research bodies that might provide such competencies while using the destination as a testbed for research and the development of new solutions.

Data

Each destination generates relevant context-specific information or statistics about their surrounding environment that can be easily accessed and made freely available as open data. From data on population, economy and employment, environment to cultural institutions and heritage, transport and education, the amount of data generated and collected which could be useful also for tourism purposes is considerable and often not exploited at full potential.

In this context, given the intention, mandate, ad resources to lead the transition to a data-driven tourism policy making, DMOs should promote the mapping of all the possible available 'in-house' data sources, trying to first break internal 'data silos', and then make them available in the form of open data to the wider ecosystem in a consistent and easily processable format. Interoperability and standardisation should be ensured to increase re-use and comparability of data and information, as well as to foster the adoption of technologies and data-based innovations.

In addition, the data-related aspects of a smart tourism strategy should encompass external data acquisition to complement the data internally available. By doing so, the data acquired will be as complete as possible, integrating both internal and external knowledge and know-how. Therefore, the external and/or private owners of relevant high-value data sets should be identified in order to purchase such data or establish mutually beneficial partnerships.

At the same time, destinations should implement at least a first set of quantitative and qualitative indicators – which can be progressively expanded or deepened - covering at least key areas such as digitalization level of stakeholders, destination inclusiveness and accessibility, social, economic and environmental sustainability. Indicators should be used to monitor smart tourism activities periodically, measuring their progress and results, to inform further actions.

Since the initial planning of data collection and data management activities, data privacy and security provisions should be taken into consideration, to avoid any drawback at implementation stage. In addition to ensuring compliance with the key legal framework (e.g., GDPR) specific aspects on cross-organisation, cross-domain or cross-border data sharing and exchange should also be considered.

Infrastructure and technology

Data-driven solutions have to be supported by enabling technologies that allow data flows and data analytics. Destinations should invest in scalable IT architectures through streamlined procurement procedures, in order to be prepared for the evolution of technology, including both open source and proprietary software. The IT solutions ought to fulfil different purposes for different internal stakeholders (e.g., decision-makers may want to have visualisation and simulation tools, data analysts may need data integration instruments, etc.).

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Open APIs for instance can make data available to third parties for use and re-use, thanks to open schemas, common vocabularies and standards. Providing private businesses access to open data can foster digital transformation towards innovation, while reducing costs and the risk perception (as private businesses bear the costs and risks of developing new solutions), especially in resource-constrained contexts.

In addition, public and private actors are increasingly investing in decentralised solutions to data sharing such as 'data spaces' that can benefit the entire ecosystem, while minimising access barriers and hardware costs. Starting data standardisation and collaborations such as in the context of Open APIs can facilitate the transition to new forms of data mastering on the short run.

Entrepreneurship and business

Enhancing the collaboration between the DMO and the private sector is a crucial aspect of a smart tourism strategy. On the one hand the DMO has to identify strategic partners that can provide key data analytics and travel intelligence services which can be used to support policy making and destination management.

On the other hand, the DMO should cooperate with other actors supporting innovation in the ecosystem (e.g., Innovation funds, Digital Innovation Hubs, etc.) to establish a supporting framework for the digitalisation of tourism business models, value chains and ecosystems, inclusive of the entire spectrum of private actors, including small local businesses, SMEs and individual/freelancer professionals.

Concrete actions to support digital transformation and the widespread adoption of data-driven might include:

- Specific policy measures to support travel-tech incubators, accelerators, mentoring sessions and other non-tech initiatives (e.g., tourism networks),
- Revise and update the regulatory frameworks to promote fair competition and encourage innovation,
- Set-up incentives and financial/procurement support for the acquisition of enabling digital technologies, tools, and business solutions for tourism actors,
- Fostering/strengthening collaborations between traditional and digital native enterprises to enhance knowledge sharing,
- Facilitating increased access to high-speed broadband and other digital infrastructures for tourism businesses and visitors,
- Design awareness-raising campaigns to share knowledge on the potential benefits of digitalisation and data-driven approaches to smart tourism.

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