OECD Tourism Papers 2024/02

Artificial Intelligence and tourism

G7/OECD POLICY PAPER

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G7/OECD policy paper

The G7/OECD policy paper on artificial intelligence and tourism highlights the potential to harness AI as a tool to promote innovation and the sustainable development of tourism. It discusses the opportunities and risks AI brings, and what this means for tourists, businesses, destinations and governments. Key policy issues are identified, including the need to: i) put in place robust data and consumer protection measures as AI is used to create personalised tourist experiences; ii) monitor the impact on tourism jobs and protect and prepare workers as AI used to improve operational efficiency; and iii) support tourism businesses, and SMEs in particular, to keep pace with rapid AI developments and comply with evolving legal and regulatory frameworks, while fostering a dynamic environment for innovation.

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Acknowledgements

Table of contents

Key messages: Harnessing AI to support tourism innovation and sustainability

Artificial Intelligence (AI) is emerging as a transformative force in tourism, offering significant innovation potential to address pressing challenges within the sector. While adoption rates across different tourism segments remain variable, the current and potential impacts of AI are becoming increasingly tangible and there is a need to navigate the potential opportunities, challenges and risks it presents. G7 members are leading the AI agenda through work at national level and are also driving efforts to promote the adoption and diffusion of AI in businesses, globally. This policy paper contributes to expanding this leadership at the sectoral level by delving into the potential AI applications and risks associated with **harnessing AI to promote innovation and support tourism sustainability.**

The extent to which AI will ultimately impact and transform the tourism sector with its unique characteristics and reliance on in-person, high-touch experiences remains uncertain, but is a growing topic of attention and debate. To inform this discussion, there is a need in the first instance for policy makers to **understand the potential of AI to enhance innovation.** This includes developing a better understanding of the complex digital environment for tourism and the key components of AI systems, as well as relevant national and international AI principles and guidelines. Sector-specific principles for AI implementation or guidance are increasing but are not uniformly available across sectors.

Many AI-related applications have already been adopted in the tourism sector, with further scope for innovation to support sustainable and inclusive tourism development. Analysis of existing **applications and potential of AI in tourism** shows the variety of implemented and planned AI applications in place with the potential to:

- Enhance the visitor experience with more interactive, personalised experiences and seamless travel, while increasing responsiveness to demand with 24/7 and more personalised services.
- Improve accessibility and audience engagement with greater accessibility of content and diversified offer of culture and recreation services.
- Enhance market intelligence and data use, as well as capacity for market segmentation and customer profiling.
- Optimise visitor flows and traffic management with real-time data and automated decision making.
- Support price/cost optimisation, through predictive maintenance, resource use and procurement.
- Automate internal processes and basic customer services.

AI can support efforts to promote sustainable tourism practices through its ability to assist in managing resources more efficiently, including energy use, waste reduction, and skill-oriented workforce allocation, and optimising tourist flows. In turn, the quality of life for residents of local communities could be improved by greener transport options, better managing tourism flows at popular sites, and ensuring a more equitable distribution of tourism benefits. This will require continuous evaluation and adaptation of AI technologies to align with environmental and social sustainability goals, ensuring that the tourism sector contributes to conservation efforts and benefits for local economies.

AI also offers the potential to enhance the efficiency, responsiveness, and accountability of tourism policy making, while also enabling more informed decision-making through the collection and analysis of timely, granular data to build a more substantial evidence base. Training can help increase AI literacy among key stakeholders and raise awareness among tourism businesses and destinations to

capture the potential opportunities and risks associated with AI. Destination management organisations and industry associations could play a leading role in guiding their networks, and supporting peer learning, data sharing and curation. Finally, policy makers need to also consider the evolving regulatory environment and the high pace at which technologies continue to develop, which may require tailored help to create a supportive environment for tourism businesses.

However, there are *risks associated with AI adoption in tourism*, including concerns about data quality, security, and environmental impacts. Uptake of advanced technologies also lags in the sector. Addressing these issues requires balanced policy approaches to ensure that the introduction of AI technologies is in line with tourism priorities, at the national and sub-national level, and supports the sustainable transformation of the sector. This includes boosting climate action, balancing tourism flows, building a strong and inclusive workforce, optimising the socio-economic value of tourism for local communities, and supporting small-scale enterprises to innovate with rapid technological change (OECD, 2024[1]).

Against this background, this policy paper identifies several **key issues** that policy makers need to consider when supporting the adoption of AI technologies in the tourism sector:

- **Using AI to develop personalised tourist experiences interactions will require robust data protection and consumer safeguarding measures**: AI applications offer highly personalised travel experiences through customised recommendations and virtual assistant services, analysing individual preferences to tailor suggestions for each traveller. While these capabilities significantly boost marketing strategies, they require extensive data collection, raising privacy and ethical concerns that require robust data protection and consumer safeguarding measures. Finding the right balance for AI-enhanced service delivery without compromising the authentic, person-to-person connections that are core part of the tourism experience and differentiating factor for many businesses is also important.

- **Adoption of AI will require monitoring of impacts on jobs along the tourism value chain to safeguard against negative employment outcomes**: AI-driven automation presents opportunities for improving operational efficiency in the tourism sector. By further streamlining processes through handling more complex tasks such as bookings, logistics, and customer service, AI-enhanced innovations can help reduce overhead costs of doing business and enhance service quality. However, the automation of routine tasks poses a risk of job displacement, while the effective deployment of AI requires the up-skilling of the tourism workforce, ensuring employees are equipped to take on new roles in the sector created through the adoption of AI technologies.

- *Tourism SMEs will require support to keep pace with rapid AI developments and prevent them being left behind*: AI divides in tourism are emerging and without action are likely to increase, which calls for tailored support for businesses and destinations. The sector comprises a few big global players and new digital-born firms that are already engaged and able to leverage the benefits of AI, boosting their competitiveness relative to micro and small enterprises with more limited capacities, exacerbating existing digital gaps. Closing gaps in AI diffusion across businesses and destinations will also increase the capacity of the sector to drive sustainable and inclusive economic growth.

- **Providing guidance and support for tourism businesses to comply with evolving AI regulatory and legal frameworks will promote a dynamic environment for innovation**: Existing regulatory and legal frameworks can promote responsible AI use in tourism by providing clear guidelines for developers and operators, and facilitate the safe and ethical integration of AI technologies. It is also important to provide a safe environment for businesses to test and pilot innovation including AI applications. For example, using existing innovation hubs and competence centres will help uncover potential and existing barriers.

Artificial Intelligence and Tourism

Harnessing AI for tourism

New technologies are reshaping tourism and represent a powerful catalyst for innovation in the sector which is a key driver of growth, job creation, and business dynamics, and a vital source of prosperity for many local communities. The sector faces major **challenges and transitions** to boost climate action through developing sustainable infrastructure, balancing tourism flows, building a strong and inclusive workforce, optimising the socio-economic value of tourism for local communities, supporting micro and small enterprises to innovate with rapid technological change, and strengthening data to guide and evaluate policy action (OECD, 2024[1]). Tourism must also adapt to global transformations, including digitalisation, the green transition, demographic and cultural change, and increase the sectors resilience to external shocks, arising from geopolitical and economic instability, pandemics and climate hazards.

Artificial Intelligence (AI) has the ability to stimulate innovation and be a game changer to address these challenges and deliver on overarching policy goals. This includes more innovative approaches to fully bring the benefits of tourism to host communities, destinations and tourism businesses, including small and medium-sized enterprises (SMEs) that dominate the sector and have limited scale-up and innovation capacity. Innovative approaches could potentially support seamless and multimodal mobility, visitor flow management, productivity enhancement, climate-friendly and circular practices, and enhanced monitoring and coordination capacity. A central element in promoting innovation is to scale up the industrial structures and workforce skills, through the diffusion of technology and good practices, and provide supportive business conditions for tourism ventures.

Recent AI developments foreshadow tremendous opportunities to unlock solutions to global challenges, including for tourism. The launch of ChatGPT in November 2022 brought AI into the public sphere and generative AI to the fingertips of all. In tourism, AI has the ability to enhance innovation and unleash its potential to drive sustainable and inclusive economic development. Moving forward, these developments will likely require alignment and co-operation at the international level and on adoption and diffusion at the business level.

As the tangible impacts and benefits of AI in tourism become more apparent, so does the need to address the risks and competitive challenges it introduces, particularly for SMEs. For example, AI may intensify imbalances due to ethical and trust-related concerns emerging through algorithmic biases and data quality issues. Although these challenges are digital challenges in a broader sense, AI may enhance these risks due to the vast amounts of data processed by AI systems. These are primarily risks of market distortion and could disproportionately affect smaller entities. Security vulnerabilities could also expose sensitive personal or business information, while intellectual property concerns grow with the advancement of AI technology. If not managed carefully, AI-driven services could result in a less inclusive tourist experience, failing to adequately consider the diverse needs of travellers. Additionally, the automation potential of AI may alter job profiles and exacerbate inequality in the workforce.

Comparable data and evidence on AI diffusion across the economy is scarce, while examples of early adoption remain anecdotal. Recent data indicates that in OECD countries around 8% of all

enterprises with 10 or more employees used AI in 2023, while 14% reported performing big data analysis in 2022, with large enterprises significantly more likely to have done so (29% and 35% of businesses with 250 or more employees[1] (OECD, 2024[2]). While AI also promises significant opportunities, AI advances have not yet been associated with higher productivity growth at the macroeconomic level or with a significant change in job levels or wages either (Filippucci et al., 2024[3]; OECD, 2023[4]). The slow productivity-job effect is a feature of general-purpose technologies that require complementary investment before bringing their benefits.

Within the tourism sector, changes are also taking place at different speeds across different segments, and for different uses. Travel agencies, tour operators and other intermediary travel services are more rapid adopters, combining different AI systems with enabling technologies, and leading in the global adoption of chatbots and virtual assistants (Eurostat, 2024[5]) (Figure 2). In 2023, 11% of firms in the travel agency and tour operator sector used at least one AI technology. This number drops to 4% in accommodation and food services (Eurostat, 2024[5]). The purpose of **AI adoption** also differs across tourism sub-sectors, and relative to other industries. Available evidence indicates that marketing and sales are the first functions for which tourism enterprises use AI, followed by business administration. In intermediary travel services, AI is more often used for R&D and innovation. However, a divide in AI usage is emerging, characterised by a few large global and digital-native firms progressing in AI, while many SMEs and less digitally intensive destinations lag behind. Many of these issues are not specific to the tourism sector, as larger businesses have the scale and resources to use AI in a way that many micro tourism businesses in particular cannot. However, addressing this AI divide will be important to give SMEs in the tourism sector opportunities to access the potential benefits that AI applications can provide.

It is in this context that this policy paper examines the potential impacts of AI on tourism, and the likely policy implications. The paper first examines how AI can enhance innovation and sustainability more broadly, before exploring the possible applications for the tourism sector (Table 1) and more specifically, how AI can be leveraged to maximise opportunities for places (*destinations*), people (*workers*, *residents* and *tourists*) and firms (tourism businesses and their business environment). It then identifies, through a tourism lens, a range of potential risks associated with AI adoption, before concluding with a discussion of initial policy considerations to maximise the potential and minimise the risks of AI in tourism.

Understanding the potential of AI to enhance innovation

The extent to which AI will impact and transform the tourism sector with its unique characteristics and reliance on in-person, high-touch experiences, is still a matter for speculation and discussion. In a first step the uneven diffusion of AI reveals the need to understand the fundamental basics of AI, and the potential it offers to stimulate innovation more broadly, before considering applications in tourism in the next section.

Artificial intelligence is a machine-based system that mimics human intelligence to learn, adapt to changing environments, and perform tasks. It is defined as "a machine-based system that, for explicit or implicit objectives, infers, from the input it receives, how to generate outputs such as predictions, content, recommendations, or decisions that can influence physical or virtual environments" (OECD, 2024[6]; OECD, 2024[7]). AI can reason, recognise patterns and make predictions or decisions, create images, text, videos and other content, control smart connected devices and robots, and have basic conversations (OECD, 2024[2]; OECD, 2022[8]). It is not one technology but a **mix of technologies that operate with other complementary technologies**, such as robotics and Internet of Things (IoT), to dramatically augment capacity for image/face recognition, natural (human) language processing, predictive capacity, automation, and more recently, content generation (Figure 1). AI is data-driven and performs with (intangible) resources such as data, algorithms and skills, and (tangible) assets which make up the AI computing infrastructure.

The application of AI is already prevalent in many aspects of daily life and can profoundly transform how businesses operate and innovate, and **this will have implications for what is an increasingly complex**

digital environment for tourism. AI is said to have a transformative impact on economies and societies, and pervasive effects across all sectors and industries. Chatbots, virtual assistants and facial ID are embedded in smartphones, apps, and websites. AI-powered robotics are used in healthcare, transport, or space exploration, for patient monitoring and care, navigation in self-driving cars, or experimentation in Outer Space. AI can analyse the large volume of data generated by IoT devices, make predictions or recommendations (e.g. for customer profiling, weather forecasting) and intervene in the physical world (e.g. real-time manufacturing or predictive maintenance).

Essential components that support AI (Figure 1) include detailing the training methods, infrastructure advancements, and skills for effective deployment and continuous enhancement:

- AI is trained by processing large amounts of data to identify patterns and induce predictions. The larger the volume of quality and relevant data, the better.
- Algorithms are a set of step-by-step instructions that provide rules to guide AI on how to process this information. Once trained, the AI model can make predictions or decisions based on new data, and can keep improving through machine learning with more training, better data and importantly, human feedback.
- AI infrastructure encompasses computing power (e.g. processors), data pipelines and storage facilities (e.g. data warehouses), high-speed networks and supporting software and platforms.
- Advanced technical skills, including statistical, mathematical or programming skills, are required by practitioners and developers to utilise AI effectively. Similarly, (non-AI) expert and soft skills, such as domain knowledge, critical thinking and communication skills are important to train the machine and interpret results. AI diffusion also requires a collective data culture (OECD, 2022[9]).

Figure 1. Assets and output of an AI system
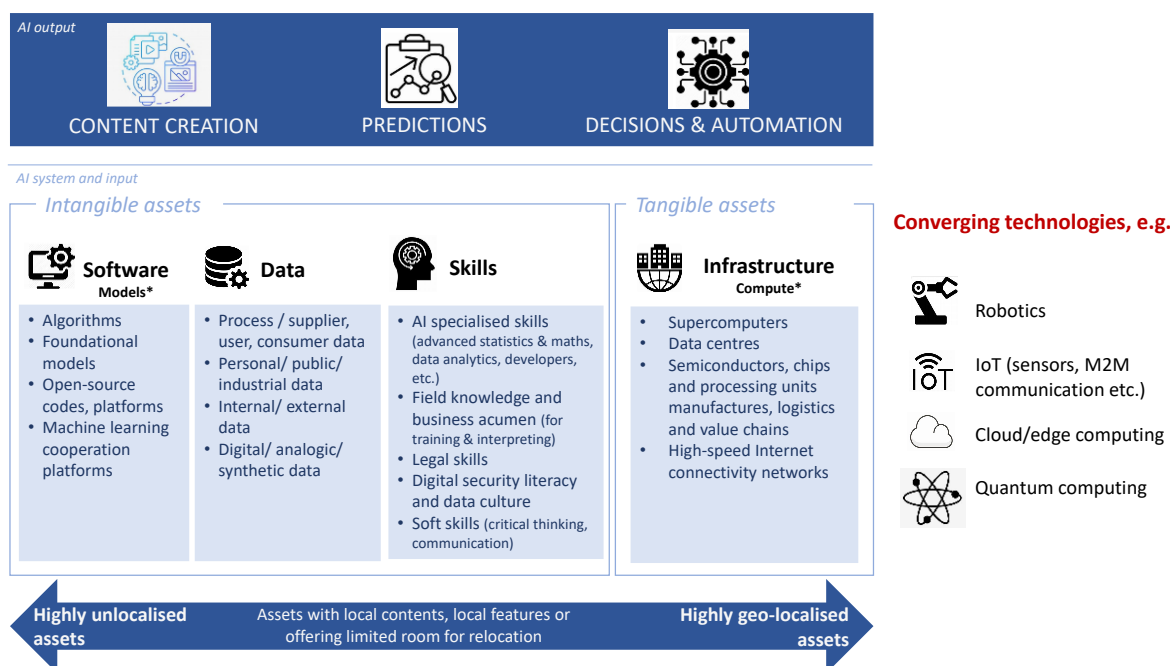
Note: M2M – Machine to Machine. Compute refers to the computational power required to train and run AI models, including processing power, memory and storage.
Source: (Kergroach, 2024 forthcoming) based on (OECD, 2024[2]; OECD, 2021[10]; OECD, 2022[9]).

Table 1. Examples of potential AI applications for businesses

AI applications	Innovation capacity / sustainability
Strategic planning (including strategy development, decision-making and management)	
- Analysis and visualisation of trends, operations and customer data through AI-enhanced business intelligence - Assessment of ESG impact, supplier reliability and compliance with regulatory frameworks, especially if combined with blockchain	- Improves strategic decision making and agility with more timely data and projection. - Enables environmental and safety regulation compliance. - Increases coordination and resource efficiency across the tourism ecosystem.
General administration (including human resources, skills development, accounting, finance, and internal communication)	
- Automation of administrative tasks including accounting, reporting and payroll, audits and certification procedures - Performance monitoring and analytics (both business and HR performance) - Tailored training and reskilling programs to meet the needs of each tourism professional and progress tourism careers (e.g. AI-powered training platforms, interactive/ conversational training, micro-credentials, etc). - Knowledge and information management (e.g. self-service knowledge with AI-enhanced search and analytical functions, real-time on-site monitoring data shared among actors in the tourism ecosystem).	- Greater operational efficiency with human resources available for other activities. - Enhances recruitment accuracy and possible job satisfaction, differentiating by working conditions, wages, benefits or responsibilities. - Helps anticipate skills shortage and future needs in the tourism sector. - Enhances service quality with more targeted/personalised training
Business intelligence and product development (including R&D, and monitoring)	
- Utilising data analytics for corporate, production, and customer data and building on existing and new large scale data sets (social media, satellite data and terrestrial data generated from computer vision, sensors, drones). - Automate scientific processes and prototyping. Simulators and digital twins can monitor and predict the performance of tourism infrastructure, assessing impacts related to visitor numbers, weather, and pollution to inform timely maintenance and system-level interventions, ultimately improving cost efficiency and reducing service disruption risks. - Identifying insights that can be integrated with travel intermediation platforms (flights, trains, accommodation, car rental etc.). - Cost-effective development and predictive maintenance with Generative AI and 3D printing.	- Increases predictive capacity, business projections, and scenarios to forecast demand more accurately and improves site destination management (e.g. seasonality, crowding). - Provides more targeted offerings to tourists and increases responsiveness. - Informs product development through direct market feedback during product conception and early development. - Speeds up R&D cycles and uncovers opportunities for productivity and quality improvements.

Marketing and sales (including advertising, branding, customer services and external communication)	
• Enhancing market analytics (e.g. segmentation, and sales forecasting) based on greater business intelligence • Enabling personalised travel recommendations and planning (routes, connections), marketing and dynamic pricing strategies, if marketing and sales are well-integrated • Mass customisation ("segment of ONE"), and big-data-optimised offerings • Providing assistance in content creation, visual communication, branding, etc. • Automating customer services (chatbots).	• Increases market reach and personalisation, fostering sustainable marketing practices through tailored and efficient customer engagement. • Optimises occupancy and pricing. • Improves the booking experience, customer engagement and satisfaction • Improves the overall match between traveller preferences and offerings.
Operations management (including logistics, sourcing, procurement, networks, and supply-chain management)	
• Data analytics on contract management and strategic sourcing. • Smart logistics and real-time tracking – across the supply chain and the customer journey (e.g. autonomous vehicles, smart roads, smart baggage handling, managing tourist flows, real time communication and navigation to tourists). • Seam travel and border crossing through facial recognition (e.g. simplified visa and entry procedures, security and boarding, check-in). • Predictive maintenance (e.g. robotised cleaning and sanitary inspection). • Automated services through smart devices (heating, lighting).	• Enhances operational sustainability, efficiency and reduced environmental impact through better resource allocation (e.g. circular practices, food, waste management). • Improves risk management and responsiveness. • Optimises visitor flows and transport management by reducing congestion and waiting times through automated vehicle routing and seamless connections between sites and hubs, ensuring no delays and promoting greener mobility. • Improves safety conditions (less casualties, damages, and insurance cost).
Digital products	
• Enhancing accessibility, personalisation and content creation of virtual tours, tours of museums and cultural sites, if combined with virtual/augmented reality. • Creating interactive exhibitions or journeys, with interactive map and visual and sound. • Creating content, restoring artworks or cataloguing artefacts related to culture and heritage utilising generative AI. • Recreating historic sites with 'digital twins' and supporting the analysis of ancient documents and information (immersive/ virtual experience).	• Diversifying offer of culture and recreation services • Greater accessibility of content, culture and artworks.

Source: Based on (OECD, 2021[10]).

AI's implications on business functions are wide-ranging and are about to trigger a fifth Industrial Revolution at a high pace (OECD, 2024[2]). Table 1 summarises these applications and possible outcomes for innovation and sustainability (full table including examples in Annex A).

Machine learning can lower costs related to prediction and decision-making, as well as automate business forecasts with real-time data, and reduce exposure to risks (e.g. price volatility, supply disruptions). AI can increase efficiency in asset or supply management, maintenance, and manufacturing automation. It can also reduce costs associated with branding and communication (e.g. content creation, images, narrative, video) or increase capacity for customer profiling and more efficient marketing.

Beyond cost savings, AI offers potential to bring productivity gains by enabling firms to refocus activities on higher value-added functions. AI systems could eventually help businesses, especially small enterprises, to overcome administrative bottlenecks (e.g. reporting, accounting), better assess their Environmental, Social and Governance (ESG) performance, and better comply with regulations or taxation requirements (Kergroach, 2024 forthcoming[11]; OECD, 2021[10]).

AI can further strengthen the overall business conditions under which businesses operate. Examples of relevance for businesses include enhancing public service efficiency (e.g. speeding up permit processing for new ventures), securing digital infrastructure, or reducing transaction costs in finance markets (OECD, 2021[10]; OECD, 2019[12]).

Machine learning can enhance the quality of public administration by improving understanding of user needs (OECD, 2020[13]). Using language processing to mine documents could make case examination and dispute resolution faster and cheaper. Machine learning can also help better defeat the rising number of cyber-attacks and their growing sophistication.

The AI-enabled analysis of vast amounts of credit data can lower the cost of lending to less profitable segments of the business population (e.g. small informal businesses or those operating in remote areas). For SMEs with no credit history, AI can leverage alternative data sources (e.g. social media activities, online shopping or shipping data, insurance claims etc.) to assess creditworthiness (OECD, 2020[14]).

With plenty of applications for internal business functions and supporting activities, it becomes evident that AI is a mix of technologies that will enhance innovation across industries, including tourism.

AI policies and recent developments

While businesses are moving forward with AI implementation, work is underway at national and international level to establish the necessary **regulatory and policy frameworks to support and guide the use of AI.** G7 members are leading this agenda through work at national level and are also driving efforts to promote alignment and co-operation to shape the adoption and diffusion of AI at businesses, globally.

Under Japan's Presidency in 2023, G7 members unanimously agreed on the value of AI to promote innovation and the potential of generative AI to address pressing societal challenges, but expressed profound concerns about the threats stemming from irresponsible and non-ethical uses of AI (OECD, 2023[15]). G7 Leaders agreed on making the management and mitigation of these risks, and the governance of generative AI a common policy priority, and established the "Hiroshima AI process", where G7 members continue the discussion on generative AI in an inclusive manner (OECD, 2023[15]). G7 Leaders also agreed in December 2023 on a Comprehensive Policy Framework, which includes Guiding Principles for Organizations Developing Advanced AI Systems and the Hiroshima Process International Code of Conduct for Organizations Developing Advanced AI Systems (G7 Digital & Tech Ministers' Statement, 2023[16]).

This work has carried through under the 2024 Italy G7 Presidency, with the G7 Industry, Technology and Digital Ministerial Declaration reiterating the commitment to advance the Hiroshima AI Process, with the

support of the OECD, and harness the innovative potential of AI to usher in a new era of global productivity and economic growth. G7 Leaders subsequently committed to deepen co-operation to harness the benefits and manage the risks of AI in the Apulia Leaders Communiqué.

In 2019, the OECD adopted AI Principles to promote trustworthy and human-centric AI and provide policy makers with recommendations for effective AI policies (Box 1). **The OECD AI Principles were updated and adopted at the 2024 OECD Ministerial Council Meeting** to stay abreast of rapid technological developments (OECD, 2024[17]). The Principles focus on the major risks associated with the misuse of AI, and emphasize values such as inclusiveness fairness, transparency, accountability, and respect for human rights, along with how to address these challenges.

Box 1. OECD AI Principles

The OECD Working Party on AI Governance meetings leading up to the agreement on the updated definition of an AI system and on the explanatory memorandum: 'An AI system is a machine-based system that, for explicit or implicit objectives, infers, from the input it receives, how to generate outputs such as predictions, content, recommendations, or decisions that can influence physical or virtual environments. Different AI systems vary in their levels of autonomy and adaptiveness after deployment.' (OECD, 2024[6]).

The OECD AI Principles were adopted in 2019 and updated in May 2024. They promote trustworthy and human-centric AI and provide policy makers with recommendations for effective AI policies.

Value-based principles:

- Inclusive growth, sustainable development and well-being
- Human rights and democratic values, including fairness and privacy
- Transparency and explainability
- Robustness, security and safety
- Accountability

Recommendations for policy makers:

- Investing in AI research and development
- Fostering an inclusive AI enabling ecosystem
- Shaping an enabling interoperable governance and policy environment for AI
- Building human capacity and preparing for labour market transitions
- International co-operation for trustworthy AI

In 2024, the EU adopted the **AI Act that regulates the use of AI in EU member states** (European Union, 2024[18]). This landmark legislation aims to ensure the safety and fundamental rights protection in the development and use of AI systems across the EU, across various sectors, including tourism. The rules establish obligations for providers and developers of AI systems marketed or used within the EU depending on their risk level. The AI Act aims at ensuring the safety and protecting fundamental rights in relation to AI systems used in the EU.

G7 members continue to develop their AI principles and strategies to explore pathways to harness the AI potential for innovation while minimising risks (Box 2).

Box 2. AI strategies in G7 countries

- Canada has launched the Pan-Canadian AI Strategy in 2017, the first in the world and introduced an AI and Data Act in 2022 (Government of Canada, 2021[19]).
- France initially launched the National Strategy for AI in 2018 under the claim of 'AI for Humanity', which has been further developed by the AI Commission (France Artificial Intelligence Commission, 2024[20]).
- Germany illustrates its goals in the National AI Strategy and concretises measures in action plans (Ministry for Education and Research Germany, 2018[21]).
- The Italian Strategy for Artificial Intelligence 2024-2026 aims to harness AI technologies to drive innovation and productivity across various sectors (Department for Digital Transformation in Italy, 2024[22]).
- Japan has detailed its intention in Tentative Summary of AI Issues considering fast development of generative AI, while basing on AI Strategy 2024 and Principles of Human-Centric AI Society (Japan, 2023[23]).
- The United Kingdom has launched a National AI Strategy alongside a specific Transport AI Strategy that is planned to be published in 2024 (Government of the United Kingdom, 2021[24]).
- The United States outlines its plans in the National Artificial Intelligence Research and Development Strategic Plan 2023 Update, with a focus on research and development (National Science and Technology Council, 2023[25]).

Sector-specific principles for AI implementation or guidance are increasing but are not uniformly available across sectors. For the tourism sector in Germany, the National Tourism Strategy has set a focus on digitalisation with AI as a crucial component, while the US will consider incorporating AI into the next tourism strategy. Given the global scope of the tourism sector, the development of AI to enhance innovation in the sector is inherently complex and could benefit from collaboration across international borders. This is further reflected in the AI business landscape, which is significantly shaped by multinational companies.

Applications and potential of AI in tourism

To understand how AI can unlock innovation and sustainability in tourism, it is important to consider the specific characteristics of the tourism sector. Tourism is a complex, service-based sector that is made up of primarily SMEs, which operate in a global tourism economy structured by a smaller number of large tourism enterprises. This is a key consideration for the potential and uptake of AI in the sector.

Entrepreneurship and digitalisation play crucial roles in the innovation of the sector, which often integrates local knowledge and assets with global market connectivity through cross-border co-operation and value-chain collaborations. These characteristics mean the public sector often plays an important role as a partner and facilitator for innovation, implementing policies that support the development of new business models, and manage risks. Digital technologies can support efforts to promote more sustainable practices in tourism, by supporting more efficient resource management and helping to distribute tourist traffic more evenly across destinations while enhancing visitor experiences, to in turn mitigate the environmental impacts and promote local economic growth. However, AI adoption and diffusion depends on a range of factors and context conditions that need to be taken into account as well.

The tourism sector has already adopted many AI-related applications with further innovation or even transformation ahead. The table in Annex A shows the variety of implemented and planned AI applications in tourism. **Key potential** applications that stand out include the opportunity to:

- *Enhance the visitor experience* with more interactive, personalised experiences and seamless travel, while increasing responsiveness to demand with 24/7 and more personalised services.
- *Improve accessibility and audience engagement* with greater accessibility of content and diversified offer of culture and recreation services.
- *Enhance market intelligence and data use*, and capacity for market segmentation and customer profiling.
- *Optimise visitor flows and traffic management* with real-time data and automated decision making.
- *Support price/cost optimisation*, through predictive maintenance, resource use and procurement.
- **Automate internal processes and basic customer services**.

Various stakeholders in the tourism sector, businesses, workers, destinations, and national and subnational governments are set to benefit from this transformation. The potential AI applications and benefits differ for different stakeholders and are presented in this section. While the exact nature of the applications may differ across stakeholders, the examples presented may be relevant for various stakeholder groups.

AI for policy makers

As in other domains, AI provides the **potential to improve the efficiency, responsiveness, and accountability** of tourism public administrations. Efficiency through task automation, rationalising processes, predictive analytics, or automation of audits or certification procedures. Responsiveness through greater behavioural insights for more user-centric services, and greater responsiveness (real-time) in operations. Accountability through tracking tools that bring transparency in public finance, legislation, or public procurement processes (e.g. watchdog). AI-powered e-government platforms could be more efficient and user-friendly, with virtual assistants offering support to access information and services, while at the same time generating more potential user/traveller/business data for decision making.

Key to better inform tourism policy making is **gathering and analysing data** at a more granular level and building a larger evidence base (OECD, 2020[26]). AI helps leverage novel sources of data, such as social media, digital footprint left by tourists who increasingly book and prepare trips online, visa or consumption transactions, or behavioural or geospatial data, that bring new insights on the state of tourism, with deep dives at regional or local levels.

These **new data sources** can help track current tourism policy needs, and identify opportunities in and between destinations, and notably for coordinating innovation, investment, or marketing efforts. These data sources may become critical for developing integrated seamless multimodal mobility systems or diversifying the tourism offer. In addition, developing AI applications mutually benefits open data initiatives - i.e. sharing of public data and records for promoting innovation in the tourism sector - by unlocking solutions for data processing, analysis and interpretation (e.g. interactive dashboards).

An important mission for tourism policy makers in national tourism administrations is to **ensure policy alignment** with other relevant ministries and agencies. There are strong complementarities between the portfolio of tourism administrations and responsibilities that fall under other administrations such as those in charge of transport and infrastructure, SMEs and entrepreneurship, regional development and smart specialisation (industry), local employment, arts and culture, and environment and biodiversity. AI could

potentially help identify synergies and trade-offs at a scale never reached before and reinforce horizontal coordination.

In the same vein, tourism policy is characterised by strong interactions between local, regional, and national governments, as well as between public, semi-public and private actors in the sector. Destination management organisations are for instance important components of effective sub-national governance in many destinations. AI can **strengthen interoperability**, data sharing, communication and interagency coordination (e.g. the creation of central repositories, virtual assistants for collaboration, natural language processing for document management, simulations and scenarios).

Examples of AI usage in public administration are still relatively scarce, but pilot projects and AI strategies illustrate potential applications. For instance, Visto AI in Canada enhances the immigration and visa application process with AI-driven personalised guidance and real-time updates, aimed at simplifying legal procedures and boosting approval chances. In Korea, national strategies focus on expanding data systems, securing computing resources, and building AI innovation hubs to stimulate balanced development. Portugal's Environment Agency uses AI for waste management analysis and control in the transport sector. Brazil's Supreme Audit Institution employs "Sofia," an AI system that aids auditors by identifying errors and providing relevant data alerts. Meanwhile, the Netherlands' Geronimo AI assists the Central Government Real Estate Agency by analysing satellite imagery and crop data to manage land leases and monitor soil and food safety standards. The European Commission have developed an AI-Based Multilingual Services tool for a range of European stakeholders and an AI-powered text mining tool to analyse pledges for action submitted by tourism stakeholders under the Transition Pathway for Tourism. The tool offers the possibility to process large amounts of information, offering general analyses, in-depth topic exploration, content-based pledge clustering and distribution overview.

The implementation of AI in tourism policymaking poses several challenges. The **integration of such technology necessitates robust digital infrastructure and specialised expertise**, potentially leading to disparities due to uneven access across and within different regions. This is further aggravated by the fact that countries have different laws and rules in destination management, which results in different competencies and responsibilities. Effective and co-ordinated approaches to implementation across regions can help to enhance the reliability of AI applications. To maintain public trust, it is necessary to ensure data protection and reduce bias within AI algorithms, as discussed in the next section. Moreover, preserving transparency and understandability in AI-driven decisions is essential to uphold accountability in public administration.

AI offers the potential to profoundly **enhance the strategic effectiveness of tourism policies through advanced data analytics and policy evaluation**. By deploying AI tools, policymakers can optimise resources, support fair business practices, and ensure equitable local populations involvement in tourism development. AI facilitates the targeted application of policies by enabling precise evaluation of tourism impacts and outcomes, ensuring that strategies are adjusted to meet sustainability goals effectively. Additionally, AI promotes greater transparency and accountability in policy implementation, fostering participatory governance that integrates feedback from diverse stakeholders through sentiment analysis and natural language processing. To guide the implementation of AI, the *G7 Toolkit for Artificial Intelligence in the Public Sector* helps policy makers and public sector leaders translate principles for safe, secure, and trustworthy Artificial Intelligence (AI) into actionable policies (OECD/UNESCO, 2024[27]).

AI for destinations and local communities

AI provides the potential to unlock new capabilities for strategic planning and coordination, business intelligence, and for managing and marketing destinations, i.e. striking a better balance between welcoming tourists and preserving natural and cultural assets and quality of life for residents. AI can increase the capacity of destinations - and low associated costs - for predictive maintenance, infrastructural upgrading, visitor flow monitoring, resource optimisation and security tracking. AI can improve visitor

management, including by tracking, anticipating, and sequencing flows, or adjusting tourism and amenities services on demand through automation, to avoid congestion and negative impact on attractions and infrastructure, for example Zoobot at Barcelona Zoo in Spain or AI Recommender in Germany (additional examples in Annex A).

In the wider destination context, AI can strengthen local action for the **preservation of natural and cultural heritage sites**, the supply of amenities, the mitigation of environmental impacts and tensions on natural ecosystems and biodiversity, or the revitalisation of non-tourist-centric areas. In particular, AI could **facilitate the planning** of renovation and infrastructure developments and investments, and create a demand for new and less in-demand destinations with pre-visualisation, profiling and optimised real-time offers.

Box 3. Examples, AI for destinations and local communities

Notre-Dame Cathedral in Paris, France: The Cathedral is being restored, guided by AI technology. Following the extensive damage, which included the destruction of the roof and spire, a digital twin of the cathedral has been created. This digital model combines prior 3D scans of the cathedral with reality capture scans and AI-powered modelling to develop precise and effective rebuilding plans. AI plays a crucial role in analysing structural data, ensuring that the restoration adheres to historical accuracy while enhancing structural integrity. The project aims to meticulously reconstruct the iconic cathedral and reinforce its structure, with the goal of reopening Notre-Dame to pilgrims and tourists while preserving its historical and cultural significance.

Analysing traveller surveys in Fukui, Japan: The Fukui Prefecture Tourism Federation uses a data management platform that collects traveller surveys and consumption data, leading to a total of over 50000 cases and 90 facilities, which require huge workloads in the analysis. To address this issue a system has been built in which AI performs analysis according to the region and selected period and displays the summary of results and suggestions. Marketing staff are able to timely and efficiently obtain information on the strengths and issues that need improvement in the region. This supports the development of improvement plans together with local commercial facilities and the Chamber of Commerce and Industry for better management and more consumption

Barcelona, Spain, Zoobot: Spain's Smart Tourism Destinations Programme has introduced an AI-enhanced chatbot designed to make the Barcelona Zoo more accessible for individuals with visual, auditory, and cognitive disabilities, as well as those with mental health disorders. This innovative chatbot utilises advanced AI to provide personalised assistance and information tailored to diverse accessibility needs. Zoobot offers real-time support and guidance, helping tourists navigate the zoo, understand exhibits, and enhance their overall experience. The AI-driven chatbot can deliver information in various formats—such as audio descriptions, text, and visual aids—to accommodate different needs.

VisitBritain, "Fake Brit Til You Make It": VisitBritain's digital marketing campaign leverages AI to engage American consumers by highlighting Britain's rich regional diversity. This campaign employs AI-driven gamification techniques that incorporate regional British dialects to create an immersive and interactive experience. By analysing user interactions and preferences, the AI tailors the campaign content to resonate with individual participants, enhancing engagement and personalisation. The anticipated outcomes include increased awareness and interest in British tourism among American audiences, a deeper appreciation of regional diversity, and a boost in VisitBritain's market presence.

In more detail, AI also plays a critical role in **maintenance and reconstruction efforts**, such as those at Notre-Dame Cathedral in Paris, France. AI can also assist in protecting cultural heritage that is vulnerable to environmental factors, natural disasters and tourism impacts. AI-powered sensors can monitor weather

and climate conditions, such as temperature, humidity and air quality, or visitor flows, locally, and enable immediate action in response to deviations from optimal conditions. AI is also increasingly used in the restoration and preservation of cultural heritage.

Selected **examples where destinations make use of AI applications** to strengthen sustainability and provide benefits to local communities are presented in Box 3.

Implementing AI in tourism destinations brings several challenges that must be managed to fully harness its benefits. Key among these is the **need for significant investment in technology** (mainly sensors, IoT) and training to deploy sophisticated AI systems effectively. There is also the risk of creating dependency on technology which can affect the experience of tourists, for example in nature-based destinations. On the other hand, digital products and VR representations of cultural heritage sites could lead to a reduced appreciation of the physical experience which could impact funding as well. Privacy concerns are another major concern, especially when sharing large volumes of personal data among a variety of service providers. Additionally, a critical mass of local service providers need to support the AI transition in order to generate benefits for tourists and destination management.

AI could significantly **enhance the attractiveness, sustainability, and resilience of tourism destinations** by providing public administrators with innovative tools to improve governance of the sector and coordination among various stakeholders. This improvement in management capabilities also strengthens its capacity to manage tourist flows sustainably. In addition to tourists, local communities benefit from AI-enhanced tourism facilities, such as more efficient and greener transport solutions, which improve everyday life for residents. If desired, AI helps distribute tourism benefits more broadly by encouraging tourists to explore less popular sites, alleviating pressure on overcrowded hotspots. This approach fosters both environmental sustainability and social sustainability, making significant strides in innovation within the tourism sector.

AI for tourism businesses

AI-enhanced innovation in the tourism sector has the potential to drive significant benefits by **optimising operations and developing new business solutions**. Across the tourism sector, AI applications demonstrate the adaptability of AI for a range of different purposes. For example, Chatbots are widely used for booking and real-time assistance (such as HiJiffy chatbots for tourism SMEs), machine learning optimises service personalisation and profiling through detailed customer data analysis, and facial recognition improves (e.g. airports in Paris or Los Angeles) security and streamlines check-ins across various sub-sectors (additional examples in Annex A).

Tourism businesses of all sizes can further use AI for more accurate translation and creative content development, while AI-driven platforms facilitate efficient matching of services to user needs (e.g. AI-driven data analysis by Toronto Tourism, Canada). **Personalised marketing and customer engagement** strategies not only enhance customer loyalty but also boost revenue through tailored recommendations. By properly integrating personalised marketing with online booking systems and real-time data, AI can address issues of seasonality and crowding, resulting in more seamless travel experiences. Additionally, **smarter operation management facilitated by AI** can lead to a reduction in the environmental footprint of tourism activities, including decreased CO_2 emissions, as tested by Hilton Hotels AI-driven energy management. Cost reductions and increased operational efficiency further underscore the relevance of AI in transforming tourism businesses.

Selected examples where businesses making use of these AI potential are presented in Box 4.

> **Box 4. Examples, AI for tourism businesses**
>
> **Tourism Toronto, Canada, Analysing tourist behaviours and preferences:** Tourism Toronto is leveraging AI to gain deeper insights into tourist behaviours and preferences by analysing large datasets that include social media activity, booking trends, and spending patterns. This data-driven approach allows Tourism Toronto to develop more targeted and effective marketing strategies, ensuring that promotional efforts resonate with diverse groups of tourists. Additionally, AI helps tailor Toronto's tourism offerings to better meet the specific needs and desires of these segments, from cultural enthusiasts to adventure seekers. The anticipated outcomes include improved visitor satisfaction, more efficient allocation of marketing resources, and increased tourism revenue.
>
> **Hilton Hotels, Energy management systems:** Hilton Hotels AI to optimise energy use within the hotels, significantly enhancing sustainability and operational efficiency. The AI-driven system monitors and analyses energy usage patterns, identifying areas of excessive consumption and adjusting heating, ventilation, and air conditioning (HVAC) systems accordingly. By incorporating real-time data such as weather forecasts and occupancy predictions, the AI can make dynamic adjustments to optimise energy use, ensuring that comfort levels are maintained while minimising waste. This proactive approach not only reduces the hotel's carbon footprint but also leads to substantial cost savings on energy expenditures.
>
> **Disneyland Parks, Management of crowd flows:** Disneyland Parks is harnessing advanced data collection and artificial intelligence to enhance visitor experience and manage crowd flow more effectively. By utilising data from wristbands issued to hotel guests, along with numerous IoT sensors and cameras throughout the resort, the parks can monitor and analyse real-time visitor movement and identify overcrowded areas. This data-driven approach allows Disneyland to implement efficient crowd management strategies and optimise guest experiences. Through the My Disney Experience mobile app, visitors can access up-to-date information on crowd levels and receive guidance on less congested areas to explore. The integration of AI in analysing this data helps in predicting visitor patterns and making adjustments to park operations

Various sub-sectors face **challenges in digitalisation and especially in AI adoption**. As in previous technological shifts, AI diffusion is uneven, favouring more advanced economies, larger firms and high-tech and knowledge-intensive sectors (Eurostat, 2024[28]). AI presents challenges such as high initial costs for technology and training, navigating complex data privacy and security laws, and addressing a significant skills gap in AI-related expertise. The benefits of technology adoption accrue more to early adopters. Actors with more capital, technology and capability (skills, knowledge) are more likely to transition first (OECD, 2021[10]). SMEs, emerging economies and catching-up regions face greater challenges in the transition (OECD, 2021[10]). In addition, concerns regarding data security and protection are becoming relevant as a vast amount of data is the key to many of the above examples, especially when multiple businesses are co-operating.

AI-driven innovations also offer potential to support tourism businesses to **implement more sustainable business practices**. This may include leveraging AI to streamline operations and optimise resource use, which directly contributes to reduced environmental impacts. By employing AI for data analysis and operational adjustments, businesses can implement more efficient energy usage, waste reduction strategies, and better manage tourist distribution. Although there are potential downsides, AI could help in reducing the ecological footprint of tourism activities but also ensures that business operations are aligned with sustainability goals.

AI for tourism workers

AI has the potential to impact tourism workers, as it is **changing jobs as well as the skills** that are required to carry them out (OECD, 2023[4]). However, studies about the impact of AI on jobs remain sector-specific and scarce, with the implications for workers unclear. In an OECD study, employers report that AI has increased the importance of specialised AI skills, but has also increased the importance of human skills even more. AI is creating more complex, interesting and better paid tasks, and can in turn eliminate the dangerous, dirty or demeaning ones (3"D"s). For "bottleneck skills" like complex problem-solving, high-level management and social interaction, job replacement is currently not likely (Lassébie and Quintini, 2022[29]). In addition, workers benefit from AI-driven analysis that provides quick and in-depth insights (e.g. data analysis at Cathay Pacific Airways) and enhanced training possibilities (e.g. education scenarios at MGM Resorts) in addition to improved resource and capacity planning.

For labour-intensive tasks, chatbots and robots are likely to take over cleaning, room service, maintenance, luggage and carrying, basic information or intermediary management tasks at some point. Meanwhile, **workers will be called to more complex social interactions**, such as hyper-personalised attendance, complaint or crisis management, just-in-time decision taking, which will require critical thinking, empathy and psychology, creativity, and a deep knowledge of destinations and tourist profiles (additional examples in Annex A).

Selected **examples where tourism workers benefit from AI applications** are presented in Box 5.

Box 5. Examples, AI for tourism workers

Cathay Pacific Airways, Cathay Machine Learning Innovation Hub: The hub intends to advance technologies to improve operations: development of a tool to automate the classification of customer feedback from online and offline channels to enhance service responsiveness, creation of a revenue management system designed to assist the sales team in adjusting prices based on demand and availability. AI plays a pivotal role in analysing large volumes of feedback and market data to optimise service and pricing strategies. Expected outcomes include more efficient handling of customer feedback, increased service quality, and improved revenue management, leading to a better customer experience and enhanced financial performance.

MGM Resorts, AI-driven virtual reality training: In collaboration with Strivr, MGM Resorts uses AI in combination with virtual reality to simulate lifelike scenarios based on historical examples. This technology exposes frontline employees to various situations and helps them develop and refine their skills in a controlled yet dynamic environment, improving their ability to handle real-world challenges effectively. The AI-driven virtual reality training aims to boost employee preparedness, enhance customer service, and elevate overall operational efficiency. The anticipated outcomes include a more skilled and responsive workforce, leading to improved guest experiences and operational performance.

International airports in Paris (Charles de Gaulle, Orly), Los Angeles, Vancouver and San Jose: Airports are using AI-powered facial recognition technology to streamline airport security and passenger processing. This approach replaces traditional boarding passes and passport controls with biometric identification. AI plays a critical role in accurately verifying identities and ensuring smooth and secure passenger flow. By automating and enhancing the verification process, these airports aim to reduce wait times at pressure points, minimise security breaches, and improve overall traveller convenience.

The implementation of AI applications in the tourism sector is reshaping job roles and skill demands for workers which raises challenges. As routine and physically demanding tasks become automated, such as maintenance and basic customer interactions, there is a **heightened need for advanced human skills**. Workers are increasingly required to manage complex situations like crisis resolution and the provision of

hyper-personalised customer service, which requires technical skills, critical thinking, and a robust understanding of AI tools. This shift in tasks alongside AI requires investment in retraining and upskilling, which could be a challenge for the industry as well. However, many national or sub-national platforms and hubs in tourism provide a diverse set of AI courses and training to assist in this transition, for example Visit England's Business Advice Hub or the German SME Digital Centre for Tourism. Further challenges and privacy issues may emerge due to AI-based performance analysis.

AI can enhance job quality in the tourism sector by fostering worker engagement, increasing autonomy, and improving both mental and physical health at work. Innovations in AI support preventive medicine, helping to reduce the risks and prevalence of occupational diseases, such as stress-related conditions among front-desk staff and physical ailments within housekeeping teams. Moreover, AI contributes to social sustainability by decreasing work precarity and periods of joblessness through better matching of skill demand and supply, thus enhancing transparency in labour markets. This leads to improved opportunities for mobility within larger firms or groups, helping to manage seasonality and risks more effectively. Consequently, the employment outlook for tourism workers could become more stable, with working conditions becoming less informal and contracts more secure.

AI for tourists

AI applications provide the **potential to reshape how visitors experience and interact with destinations**. From AI-enhanced marketing strategies and personalised communications in hotel management to immersive virtual reality tours of world-famous landmarks, these innovations are not only enhancing the visitor experience but also improving accessibility and engaging a broader audience. Although many AI applications have an impact on internal operations and efficiency, the outcomes benefit the tourists as well. For example, optimised traffic management and visitor flows will reduce overcrowding; internal optimisation will free up human resources for front-end interactions, or detailed market analysis will increase personalisation and thus the experience value (additional examples in Annex A).

> **Box 6. Examples, AI for tourists**
>
> **"SmartGuide AI", Digital audio guide application:** This initiative utilises AI-driven technologies to personalise travel recommendations, aiming to optimise tourist distribution and enhance visitor experiences. By analysing user preferences and interactions, SmartGuide's AI system customises content, suggesting unique activities and less frequented sites. This approach helps mitigate overcrowding at popular destinations and promotes a more even spread of tourist activity. The project assesses its impact in various global locations, contributing to sustainable tourism efforts by encouraging exploration beyond traditional hotspots.
>
> **"AI-based Recommender for sustainable tourism", Germany:** Funded by Germany's Federal Ministry of the Environment, the AI-based Recommender for sustainable tourism (AIR utilises AI to promote sustainable tourism by optimising visitor distribution. Running since 2022, AIR employs AI tools like smart sensors and predictive algorithms within a digital management system to provide real-time insights into tourist densities and provide tourists with alternative locations to visit. The project aims to enhance tourist experiences and environmental preservation by testing these tools across varied regions in Germany.
>
> **Atout France, MarIAnne and Genial Travel:** Atout France introduced an AI-powered travel planner allowing users to input their travel preferences—such as trip type, budget, dates, and destination—and instantly receive a highly personalised day-by-day itinerary, ensuring recommendations are both customised and rich in local culture. The planner also features an integrated map, enabling users to visualise their routes, assess travel distances, and select the most sustainable transportation options.

> Complementing this is "MarIAnne," an AI chatbot that acts as a virtual travel companion, providing real-time, personalised advice and recommendations through a conversational interface.

While there are examples where tourists directly interact and benefit from AI tools (e.g. Smart Guide AI), there are also examples where tourists are significantly impacted by indirect AI applications, where businesses use AI to optimise the experience (e.g. Atout France AI-powered travel planner). Selected **examples** are presented in Box 6.

On the other hand, AI applications for tourists entail several challenges and risks. One significant concern is data privacy, as **AI systems rely on extensive personal data collection and processing to personalise experiences**, sparking issues around data security and user consent. Another risk includes the accuracy and biases of AI recommendations, which could misdirect visitor experiences if not properly trained. Additionally, there's a potential for technological dependency and low customer acceptance, where an over-reliance on AI tools might diminish the authentic human interactions essential to the travel experience. Importantly, AI algorithms can influence tourist decisions by suggesting destinations, activities, and accommodations, potentially leading to a homogenisation of travel experiences. This can exacerbate crowding in popular areas while neglecting less popular destinations, highlighting the need for careful consideration of AI's impact on accessibility and inclusivity in travel.

If these challenges are carefully managed to ensure that AI positively enhances rather than detracts from the desired experiences, AI applications for tourists could enhance sustainability. By efficiently **managing tourist flows through predictive analytics and personalised recommendations, AI contributes to reducing overcrowding at popular sites**, thereby reducing environmental strain.

Box 7. Main risks emerging in AI adoption

The main risks associated with promoting trustworthy and human-centric AI adoption can be broken down into technical risks and socio-economic risks:

The main **technical risks** and policy challenges include:

- Addressing algorithmic bias, hallucinations and data poisoning
- Ensuring transparency and accountability
- Managing security risks and data breaches

The main **socio-economic risks** and policy challenges include:

- Ensuring AI does not harm equity, fairness and human rights – including through uneven AI diffusion and nascent divides, perpetuation and amplification of discrimination and inequalities, and risks for human risks, democracy and privacy.
- Addressing distortions in competition, markets and entrepreneurship – including through algorithmic collusion and harm in competition, job destruction and violation of workers rights, and harming intellectual property.
- Minimising resource consumption, carbon emissions and other environmental impacts of AI.

Source: (OECD, 2024[2])

Risks associated with AI adoption in tourism

Despite tremendous promise and a significant potential, the adoption of AI poses some major risks, with recent advancements outpacing legislation and preparedness. The unethical deployment of AI can have

far-reaching and detrimental consequences for societies, economies, markets, and environment, as summarised in Box 7. Addressing these risks while seeking to tap into the potential opportunities AI brings for economies and societies more broadly is the focal of significant attention, at national and international level. This section discusses the main AI risks and their relevance to the tourism sector.

Slow technology diffusion

The diffusion of AI in the tourism sector reflects broader trends in technology adoption, characterised by varying speeds and degrees of integration across different business segments. As of 2023, only **about 8% of enterprises (with 10 or more employees) in OECD countries have adopted AI technologies** (OECD, 2024[2])**.** While limited data is available, this analysis utilises data from Eurostat, which, whilst specifically reflecting EU Member States, serves as a useful proxy, providing insights into adoption rates, including tourism. In the tourism sector specifically, adoption rates and purposes vary (Annex B).

The diffusion of AI in tourism carries significant risks due to the digital divide and limited acceptance of AI-driven innovations. Although the tourism sector performs strongly when implementing e-commerce, tourism businesses lag in adopting advanced technologies such as AI. Disparities in digital capabilities between large and small firms, as well as between different regions, can widen economic gaps, favouring entities with advanced technological access. This is especially challenging as the sector includes a large share of micro and also family-owned enterprises. Additionally, reluctance to adopt AI due to concerns about reliability, job loss, or cultural resistance can limit the potential benefits of AI. These challenges could slow innovation adoption, escalate operational costs, and delay enhancements in service quality and sustainability within the tourism sector.

AI adoption leaders are pivotal in showcasing how artificial intelligence can revolutionise the tourism sector, enhancing customer service, marketing, and operational efficiency. The Tourism AI Network aims to provide such leadership. As a hub for AI resources, insights, and applications specific to tourism, it seeks to illustrate the practical benefits of AI and encourage its broader adoption. Potential exists to build on the networks and competencies of existing digital hubs to implement AI in the tourism sector and overcome digitalisation barriers, including the Tourism Digital Hub Italy, Visit Finland Data Hub, Knowledge Graph in Germany and travelBI in Portugal, and European Digital Innovation Hubs.

Understanding the barriers that prevent tourism businesses from adopting and implementing AI is the first step in developing supportive policies. The Eurostat data presented in (Figure 2) shows that there is a level of consistency when it comes to the barriers faced by sub-sectors, including:

- A lack of **skills** is universally reported as a major obstacle to adoption, with over 90% of firms in accommodation and food services and close to 99% in travel agencies and tour operator reservation services, declaring a lack of expertise. This also reflects the findings of the EU-funded PANTOUR and Tourism 4.0 projects, which identify skills gaps as a key barrier to digital adoption in the tourism sector more broadly.

- **Data** is a further limiting factor, either because of a lack of availability or quality of the necessary data, or concerns regarding data protection and privacy.

- Implementing AI technology can be expensive, involving initial **investment** in the technology itself, as well as ongoing costs related to maintenance, updates, and potentially, the hiring of specialised personnel to manage and operate AI systems. The return on investment can be uncertain, making it difficult for businesses to justify the upfront costs associated with implementing these technologies.

- **Incompatibility** with existing equipment or systems, cost and a limited understanding of legal implications are also the most frequently reported reasons for a lack of uptake, and as such are prime areas for policy focus.

While these barriers are not unique to tourism, the data shows that they are felt more acutely compared to other sectors, also signalling room for targeted and pressing policy action.

Data quality and algorithmic collusion

Decent data quality and well-trained algorithms are key to the successful implementation of AI. In contrast, **poor quality or biased data can distort AI predictions**. Algorithmic collusion and exclusionary conduct can also distort market competition. Concerns have arisen about the role AI can play in facilitating tacit collusion if used to generate pricing, contributing to inflated or predatory pricing. Likewise, there are questions about the impacts of AI on markets if it is used to generate recommendations to consumers, contributing to excluding competitors and a monopolisation of markets (OECD, 2024[30]; OECD, 2024[31]; OECD, 2023[32]).

In tourism, this may lead AI to favour popular destinations and certain demographics and potentially exclude others. Algorithmic collusion could narrow demand towards "superstar" products and destinations that systems making recommendations, would highlight repeatedly. This could have the result of increasing pressure on existing supply and limiting impact of policy efforts to diversify and spread the benefits of tourism to new and emerging destinations. As a result, superstar destinations could be (further) victims of their own success if affluence leads to greater overcrowding and stress on resources and carrying capacity. This recommendation of superstars could also impact businesses, where (likely large) firms maintain profits and lead pricing, disadvantaging smaller competitors. The risk is heightened by the more rapid AI diffusion among larger tourism players. Securing fair competition is also part of national AI strategies, for example as one of five key principles of the UK AI framework.

AI's tendency to generate **false information can degrade data quality further, influencing decision-making processes negatively.** In addition, misuse of AI, such as for the distribution of misinformation, manipulation or creation of deepfakes, can result in blackmail, threats to freedom of expression, integrity and privacy, or eroding trust in online content. There has been a significant rise in the production of deepfake videos, including in tourism (Sivathanu et al., 2023[33]). For example, misleading destination videos and chatbots, fake recommendations or fake celebrity endorsements on social media, are being developed for manipulative marketing purposes, and can impact visitor decisions and perceptions, potentially leading to, unfair competition, visitor disappointment, and damaging the destination's reputation (Kirschner, 2024[34]; WIPO Magazine, 2022[35]). Likewise, **data poisoning** of online platforms due to fake reviews can undermine trust in such platforms.

Security issues and intellectual property

AI systems often require access to personal data to provide personalised services, although tourists may be wary of sharing sensitive information due to concerns about data privacy and potential misuse. **Data leaks not only expose sensitive personal information** but also highlight the broader security challenges in a highly digitalised tourism sector, further complicated by varying data protection laws like the EU General Data Protection Regulation (GDPR). This point is important as data may be protected under different laws in different jurisdictions, depending on the tourist's country of origin, country of data collection and use, and country of data storage. With a focus on AI, countries are taking different actions to enhance AI safety, for example, Canada is considering the creation of a Canadian AI Safety Institute, which would support research and international collaborations on both the technical and socio-technical aspects of AI development and deployment.

Data governance is an emerging area in the business support landscape, wherein action features more regularly within broader national economic development strategies or action plans (OECD, 2022[9]). Some subnational governments have started initiatives on a case-by-case basis, often linked to local testbeds and innovation hubs, while the European Commission is working towards the **deployment of a**

mechanism to standardise and accelerate data sharing. The tourism data space is an example. A critical issue in tourism will be cross-border data flows, where data moves beyond the reach of domestic regulatory bodies and is subject to differing regulations. Cross-data flows can occur when tourism data collection and analysis involve different countries, or organisations that operate internationally across jurisdictions.

The digital security risk has become a major threat to consider, with cyberattacks occurring more often and disrupting operations more intensively (OECD, 2023[36]). This is evidenced in the tourism sector for example by breaches in major hotel chains' reservation systems and online travel agencies. Large players in hospitality and travel services are in the line of sight, but attacks against SMEs and local governments have also intensified, exploiting ill-preparedness and trust in supply chains (OECD, 2021[10]).

AI, and generative AI in particular, raises intellectual property issues related to content creation and the misuse of protected content. **The ownership of AI-generated works is debated** (who the inventor is, between the AI system, the AI developer or the organisation using the AI). Most jurisdictions agree that AI-generated work is not copyrightable but this may change as AI evolves (Craig, 2021[37]). Legal systems worldwide also differ in how they treat intellectual property rights for AI-generated works (Murray, 2022[38]). Tourism innovation leverages critical intellectual property assets and AI innovation must navigate complex and fuzzy intellectual property systems to avoid infringement. Several AI-driven innovations in the tourism sector raise intellectual property protection issues (e.g. personalised travel recommendations, dynamic pricing algorithms or virtual tour technologies), while others leverage web scraped data that can infringe copyrights or trademark laws (e.g. travel guides, promotional material).

Job profiles and inequality

Although AI is said to change jobs as well as the skills that are required to carry them out, the overall AI impact on the labour market is uncertain, including in the tourism sector. Key issues include job automation, human resource analytics in the workplace, and potential biases and inequalities (OECD, 2023[4]). Although negative impacts of AI on employment and wages are not yet evident, significant job displacement is likely with about 27% of occupations at risk of automation due to AI (OECD, 2023[4]; OECD, 2023[39]). This is significantly more than in previous industrial revolutions. AI is already capable of performing non-routine cognitive tasks, like deductive reasoning, exposing high-pay occupations with above-average education. In addition, due to the complexity of AI, and in order to fully benefit from its potential, tourism businesses and workers will need to adapt and acquire new skill sets.

The anticipated productivity gains of businesses using AI come at the risk of worsening **employment conditions** for workers, who could suffer from ill-stewarded AI deployment. AI-driven human resource performance analytics could put pressure on employees' wages as those are automatically adjusted downwards in off-peak seasons, and on their workload as AI-driven optimisation leads to more intense work rates, erratic changes in work schedules to follow tourist flows and invasive scrutiny. This may have particular implications for lower-skilled and lower-paid jobs in the tourism sector, where businesses already struggle to attract workers.

The use of AI in the workplace raises **privacy and bias concerns** (OECD, 2019[40]). AI can change the way work is monitored and managed, which could potentially infringe upon workers' privacy and autonomy, especially if used without proper consent and safeguards. AI can also introduce or perpetuate biases in hiring, performance evaluation and promotion decisions (e.g. against minorities, age or low-educated workers).

AI systems can perpetuate and amplify discrimination and inequalities. AI hiring tools may inadvertently incorporate biases against women, people with disabilities, and ethnic minorities (OECD, 2023[4]; OECD, 2019[41]). Workers are exposed to AI-driven discriminatory practices, which can engage the reputation and legal and ethical responsibility of businesses and destinations.

The opaque nature of AI systems **reduces transparency and accountability**, making it hard for users to understand or challenge AI decisions. The complexity and proprietary nature of algorithms used in tourism recommender systems, booking platforms, automated tourist guide apps or pricing modelling make accountability and transparency challenging, as they are protected by copyrights or trade secrets, and are not transparent to users. Algorithms can charge different prices based on a user's browsing history, location or device used - something that has already been part of booking systems in the tourism industry. However, rather than applying rule-based adjustments, GenAI is using more advanced data analysis and predictive models that can lead to even more dynamic pricing strategies.

Quality and inclusivity of the tourist experience

The growing reliance on AI in the tourism sector raises several concerns about the quality and inclusivity of tourist experiences. On the one hand, the potential applications can increase the experience quality by streamlining the customer journey, real-time communication systems or personalised offers. On the other hand, the **dependence on AI for travel planning** and on-site experiences might result in a diminished personal touch, as travellers could receive poor recommendations and services due to incorrect or biased data. This risk is exacerbated by the complexity of some AI interfaces, which may intimidate or confuse tourists, especially those who are less tech-savvy, while individuals from regions with lower technological penetration might find it particularly challenging to use these AI-driven services. The disparity between tourists who can effectively navigate new technologies and those who cannot, could lead to a fragmented and inequitable travel experience and mitigate ongoing efforts to increase the accessibility of tourism services.

Additionally, the implementation of AI technologies such as facial recognition, including at airports, presents specific risks that could disproportionately affect certain groups (Buolamwini and Gebru, 2018[42]; Anderson, 2023[43]; Benedict, 2022[44]). Studies have shown that these systems often have higher error rates for individuals with darker skin tones, and women, potentially leading to time-consuming screening, increased controls, and delays for these travellers. The debate over the use of such "high-risk" AI applications is ongoing in many jurisdictions, with various legal actions and discussions aimed at limiting their use in public settings (OECD, 2021[45]). This legal landscape will directly influence the options available in the tourism sector, potentially restricting AI's application in areas where its accuracy and fairness are questioned. Under the EU AI Act, the use of applications using biometric identification systems for facial recognition are only permitted in a few exceptional situations. Moreover, the predominance of English in AI training could further marginalise non-English speaking visitors, making virtual assistants less effective and exacerbating cultural differences.

Environmental impact

Previous OECD Tourism Committee work has highlighted the need to accelerate the transition to a greener tourism economy, to translate commitments into real actions and outcomes, and embed environmental objectives into tourism policies and programmes. This includes promoting greener business models and destinations, encouraging consumers to make more sustainable travel choices, and the adoption of mitigation and adaptation measures along the tourism value chain (OECD, 2024[46]). The increasing application of AI in tourism provides potential to further improve operational efficiency, however, it also raises questions about the associated environmental impacts (OECD, 2022[47]).

A key concern in the context of wider net zero goals is energy consumption and the CO_2 emissions associated with AI. While AI can optimise resource use and support eco-innovations, it also presents sustainability challenges due to its high energy demands, particularly from deep learning, which can strain energy grids and increase carbon emissions. Electricity usage by data centres, AI, and the cryptocurrency industry may double by 2026. Data centres play a key role in increasing electricity demand across various regions. Having consumed an estimated 460 terawatt-hours (TWh) in 2022, which is roughly equivalent to

the electricity consumption of France during the same period, the total electricity consumption of data centres is projected to exceed 1,000 TWh by 2026 (IEA, 2024[48]).

Despite efficiency gains and ongoing efforts to shift to carbon-free energy sources, the **environmental pressure from AI's growing energy consumption is likely to increase** as its use becomes more widespread. Initiatives are therefore emerging to minimise the environmental impacts of AI, such as using hydropower and freshwater, exploiting atmospheric or weather conditions, rehabilitating old mines for cooling off purposes, and converting heat into power via heatpumps to redistribute it locally. At the same time, water consumption is increasingly featuring in debates around the sustainability of AI. European industry associations for data centres and cloud infrastructure list water conservation as a priority (Climate Neutral Data Centre Pact, 2022[49]). From a tourism perspective, this risks further exacerbating the already significant carbon footprint and environmental impact of tourism, even while AI offers potential to enhance resource efficiency and support sustainability efforts in the sector in other ways.

Conclusions and policy considerations

Current tourism policy priorities aim to optimise socio-economic benefits for local communities, strengthen data-driven tourism policy decisions, balance tourism flows with sustainable infrastructure, enhance the sector's role in climate action for net zero targets, and support tourism SMEs in technological adaptation. Digitalisation, increasingly AI, and innovation can play a major role in supporting sustainable tourism practices. However, **to provide a supportive enabling environment for tourism businesses it is necessary to address technical and socio-economic risks associated with AI**.

The uneven diffusion of AI in the tourism sector, highlights the need to understand the basics of AI in order to develop appropriate tourism-specific AI policies. Policy responses to the rapid evolution of AI require broad discussion beyond tourism, as concrete AI policies in tourism still remain scarce. This also requires policy makers' engagement in the AI journey, enhanced co-ordination with ministries on AI principles and guidelines (e.g. infrastructure, digitalisation, education) and ensuring the sector builds collective and local capacity for a responsible adoption. Potential policy considerations present a mixture of support to tourism businesses, and SMEs in particular, as well as workers, destinations and policy makers, including training, awareness-raising, application development and data governance:

Supporting businesses to promote the diffusion of AI in tourism

There is a need for governments **to raise awareness among tourism businesses and destinations about the potential opportunities and risks AI could bring**, how AI could apply in the sector, the real impact on jobs, and the potential complementarity of AI with the workforce. To encourage the adoption of AI, governments could establish mechanisms to acknowledge the innovative application of AI in the tourism sector, such as tourism-specific AI competitions, certificates or awards.

Even if tourism businesses have the awareness to implement AI, a major barrier to broader AI diffusion is the small scale of many tourism businesses, but also their capacity to scale up. Many tourism SMEs lack the resources and capacity to transition quickly, compared to larger businesses. Technological lock-ins, where technologies are already in place and that cannot be replaced easily, cost and legal uncertainty are further barriers to adoption, along with a lack of data management and digital skills. **Coordination of tourism policies at various levels will be critical to address the resource constraints experienced by most SMEs, including key enablers such as DMOs and industry associations** (OECD, 2024[50]).

A possible solution to compensate for a lack of internal capacity is to source AI solutions externally. Knowledge markets, digital industry and large tourism players could contribute to knowledge transfer. Software as a Service (SaaS) and Machine learning as a Service (MLaaS) are on-demand, cloud computing-based solutions to use AI, even without the prerequisite of technical knowledge. They offer

advantages in terms of costs and digital security features directly embedded in the software. In tourism, this could include engagement with cloud services that use AI for data analytics or personalised marketing.

Furthermore, digital platforms increasingly allow the centralisation of software or databases, ideas and solutions (e.g. through crowdsourcing and collaborative platforms for developing specialised software), and user/client data (e.g. through e-commerce platforms). **Dedicated platforms could support mutual learning, data sharing and curation, and the co-creation of tourism-specific AI applications**. Such platforms and services offer the benefits of AI applications and lower the entry barrier for SMEs. In line with awareness-raising activities, policy makers could enforce the communication and implementation of these services for tourism SMEs.

AI adoption will not come without cost, and tourism actors need to prepare. The issue of financing should be addressed, the question is how. **Building more evidence on the return on investment of AI applications, to inform not only the owners and managers of tourism businesses, but also investors and financial institutions, could help bridge the gap for tourism transformation**. In addition large and leading AI enterprises may engage in creating an AI ecosystem which facilitates the knowledge transfer and AI implementation of smaller enterprises. Funding schemes may already exist under the available digitalisation funds and need to be leveraged. Additional AI-specific funding opportunities could facilitate the development of platforms or services tailored to the needs of many businesses within the sector, potentially situated near existing digital hubs to leverage their networks and experience.

Finally, **enabling tourism SMEs to navigate the new legal environment will also require closer policy attention and tailored assistance.** AI focussed legislation will need to evolve to catch-up with and reflect the development and application of AI. At the same time, the regulatory framework, within which businesses operate, is evolving at pace and getting more complex, as regulators worldwide pass laws, for example, to enforce ESG practices in tourism and other value chains. SMEs are currently not well equipped to respond. AI can help compliance and reporting, provided SMEs have clear direction on their obligations and the support available across all areas. Along these lines, policy makers could foster the development of AI reporting and compliance tools that assist tourism SMEs to reflect the complex environment within which they operate, including the assessment of the local impact of tourism.

Training and education for digital skills to perform future tourism jobs

Tourism transition to AI critically depends on closing the skills gap. Job displacement in tourism will require a retraining of the workforce to be able to train, interpret and operate with AI, and fulfil new complementary tasks. AI-specific skills are key, however demand for (non-AI) expert and soft skills, such as critical thinking and communication skills, knowledge of destinations, markets and customers preferences, is likely to increase significantly. Some skills needs are likely to be generic or transversal across sectors and potentially addressed by national and local education and training systems. Other skills may however be tourism-specific (e.g. business acumen) or destination-specific (e.g. local culture).

Further considerations to help tourism SMEs to adopt AI more effectively include **strengthening AI literacy through training programmes**, inclusive technology design, involving diverse stakeholders, and robust testing and monitoring of AI systems. Coordination with education and training systems, at system, institution and local levels and coordination with actors within the tourism sector will be important to address the specific skills gaps for tourism. Solutions for promoting a skills agenda and lifelong learning in the sector are needed, including by deploying on-the-job AI-enhanced training solutions. This may include local arrangements (e.g. apprenticeships, secondments, training brokering) while certain options may be scalable to other destinations or places.

Engaging DMOs could help better inform stakeholders on AI transitions, utilising the close connection to businesses and local service providers in a place-based approach, and enhance what is currently limited transferability and diffusion of AI knowledge across environments and domains (OECD, 2021[10]). A

differentiated perspective could also help factor the local content (e.g. specific local travel themes and sites) and characteristics of AI, and the real capacity of destinations, people and firms to bridge gaps (Kergroach, 2024 forthcoming[11]).

This should be supported by destination planning and management with the necessary capacity to enhance SMEs uptake locally. **Specific guidance on how destinations and local service providers can foster AI implementation** to meet strategic goals and enhance sustainability represents a crucial first step in promoting AI diffusion. Such an approach would acknowledge the localised and small-scale nature of tourism destinations, and aligns well with the roles of DMOs, industry associations, and regional networks.

One of the main barriers to good data governance is a lack of data skills, including basic data literacy. These range from data visualisation, management (collection, curation, storing, classification), analysis (econometrics, advanced statistics and mathematics) and programming. The issue has been a focal point across OECD countries in recent years, with governments **implementing targeted educational programmes or providing financial support to firms, especially SMEs, to access specialised training or consultancy services.** In addition, there have been various data initiatives ranging from the local to the international level, that provide training but also discuss data infrastructure and governance. These can be further leveraged and tailored to AI-specific questions, including the vast amount of data or automated decision-making.

Strengthening data governance to improve quality, transparency and accountability

AI accuracy depends on the quality of data and human oversight to interpret and train the machine. Data bias or poisoning, and AI "hallucinations", can compromise predictions or lead to wrong or damaging action. **Ensuring transparency and accountability of AI algorithms** is also critical for the tourism sector, like protecting data and system integrity from cyberattacks or human negligence. Deepfakes or the use of facial recognition in public spheres are at the core of discussions on "high-risk" applications of AI.

Improving data governance is a critical condition for AI adoption, and a central point of business and policy attention, reflecting that **data has become a strategic asset** (OECD, 2022[9]). Due to the high level of collaboration in the tourism sector to deliver complex products, several projects and initiatives are underway in tourism dealing with data governance, data sharing and alternative data sources. This includes data acquisition and/or generation, management and protection, and exploitation. Data can be generated (e.g. online footprint, process data), purchased (e.g. commercial databases, data brokers), and shared and re-used to access larger volumes at lower costs. Open government data offers for instance opportunities to develop innovative commercial services from public data. In tourism, further cooperation around data sharing and the creation of data commons ("rules)" could be instrumental to take-off AI. It could take place within or between destinations, or at national level.

As AI matures, and the regulatory environment evolves at national and international level, it will be important that **tourism policy makers, and tourism stakeholders more broadly, actively monitor and engage with these developments**. These legal and regulatory frameworks will have significant implications for tourism businesses of all sizes, and for tourism policy making. Tourism will also be impacted by these frameworks, and it is important that tourism considerations are considered as the frameworks evolve. National tourism administrations will need to develop capacities in this area. The G7 Tourism Working Group can support these efforts, through building linkages with the work of other G7 working groups on specific issues related to AI.

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Note

[1] OECD used as a proxy in the absence of available data and evidence for G7 Members. G7 countries and EU Member States represent 26 of 38 OECD members.

Annex A. AI applications in tourism

Table A.1. Selected examples of AI applications to support innovation and sustainability in tourism

AI applications	Innovation capacity / sustainability	Relevant stakeholders	Examples
Strategic planning (including strategy development, decision-making and management)			
• Analysis and visualisation of trends, operations and customer data through AI-enhanced business intelligence • Assessment of ESG impact, supplier reliability and compliance with regulatory frameworks, especially if combined with blockchain	• Improves strategic decision making and agility with more timely data and projection. • Enables environmental and safety regulation compliance. • Increases coordination and resource efficiency across the tourism ecosystem.	• Highly relevant for all tourism decision makers. • Tourism workers need to be aware of, implement and train the specific AI tools that lead to strategic planning.	
General administration (including human resources, skills development, accounting, finance, and internal communication)			
• Automation of administrative tasks including accounting, reporting and payroll, audits and certification procedures • Performance monitoring and analytics (both business and HR performance) • Tailored training and reskilling programs to meet the needs of each tourism professional and progress tourism careers (e.g. AI-powered training platforms, interactive/ conversational training, micro-credentials, etc).	• Greater operational efficiency with human resources available for other activities. • Enhances recruitment accuracy and possible job satisfaction, differentiating by working conditions, wages, benefits or responsibilities. • Helps anticipate skills shortage and future needs in the tourism sector.	• Highly relevant for businesses and destinations to optimise internal processes and to allocate resources properly. • Employees benefit from AI support in administrative tasks and a better matching of tasks and competencies.	• Cathay Pacific Airways and Amazon Web Services, Tech training programme, aims to train 1,000 employees in AI over the next three years. • MGM Resorts in collaboration with Strivr, use AI and virtual reality to simulate lifelike scenarios and develop skills based on historical examples • TUI introduced AI training programmes to introduce employees to generative AI and their applications in different areas of work. Two initial e-learning courses were accessed by almost 7,000 employees in three weeks.

|			
• Knowledge and information management (e.g. self-service knowledge with AI-enhanced search and analytical functions, real-time on-site monitoring data shared among actors in the tourism ecosystem).	• Enhances service quality with more targeted/personalised training	• Policymakers need to be aware of the increased usage of AI in reporting and the potential for skills development	
Business intelligence and product development (including R&D, and monitoring)			
• Utilising data analytics for corporate, production, and customer data and building on existing and new large scale data sets (social media, satellite data and terrestrial data generated from computer vision, sensors, drones). • Automate scientific processes and prototyping. Simulators and digital twins can monitor and predict the performance of tourism infrastructure, assessing impacts related to visitor numbers, weather, and pollution to inform timely maintenance and system-level interventions, ultimately improving cost efficiency and reducing service disruption risks. • Identifying insights that can be integrated with travel intermediation platforms (flights, trains, accommodation, car rental etc.). • Cost-effective development and predictive maintenance with Generative AI and 3D printing.	• Increases predictive capacity, business projections, and scenarios to forecast demand more accurately and improves site destination management (e.g. seasonality, crowding). • Provides more targeted offerings to tourists and increases responsiveness. • Informs product development through direct market feedback during product conception and early development. • Speeds up R&D cycles and uncovers opportunities for productivity and quality improvements.	• Highly relevant for businesses, destinations and policy makers as it provides more depth in analysing tourism-relevant data.	• Japan analyses huge amounts of data in Fukui based on a traveller survey with AI to inform marketing and tourism development. • Barcelona collects and analyses data from bus stops and cameras to improve the bus network efficiency. • SITA use AI in weather forecasts and analyses operational flight plan data to create aircraft fuel consumption scenarios and help optimise climb speeds and acceleration profiles to reduce fuel consumption during takeoff. • Hilton Hotels use AI to analyse energy usage patterns based on weather forecasts and occupancy predictions to improve efficiency. • Cathay Pacific Airways is utilising machine learning to develop two tools, 1) to classify online and offline customer feedback to enhance service responsiveness, and 2) a revenue management system to assist in adjusting prices based on demand and availability. • American Airlines, in partnership with Google and Breakthrough Energy, forecast analysis, use AI forecasts analysing satellite imagery and weather data to minimise contrails, which significantly impact climate.
Marketing and sales (including advertising, branding, customer services and external communication)			
• Enhancing market analytics (e.g. segmentation, and sales forecasting) based on greater business intelligence • Enabling personalised travel recommendations and planning (routes, connections), marketing and	• Increases market reach and personalisation, fostering sustainable marketing practices through tailored and efficient customer engagement. • Optimises occupancy and pricing.	• Highly relevant for businesses and destinations to enhance their marketing and communication.	• Atout France, MarIAnne, use generative AI generate hyper-personalised travel recommendations and encourage eco-friendly choices

dynamic pricing strategies, if marketing and sales are well-integrated • Mass customisation ("segment of ONE"), and big-data-optimised offerings • Providing assistance in content creation, visual communication, branding, etc. • Automating customer services (chatbots) and translation.	• Improves the booking experience, customer engagement and satisfaction • Improves the overall match between traveller preferences and offerings.	• Tourists could benefit from personalised experiences and streamlined communication.	• Korea, If Van Gogh Visited Korea, an AI-generated video introduces viewers to South Korea's iconic tourist destinations through the unique artistic styles of 11 world-renowned painters. • Tourism Toronto use AI to analyse social media activity, booking trends, and spend patterns to develop more effective marketing and tailor offering. • VisitBritain, 'Fake Brit Til You Make It', a digital marketing campaign using AI for voice modification to regional dialects to highlight the richness of Britain's regional diversity • Destination British Columbia, BC Travel Genius, an AI-powered chatbot that answers questions about destinations, suggests itineraries, and provides information on local attractions. • Mindtrip is a collaborative travel planner that uses AI to analyse various sources of inspiration (pictures, social media links) from multiple users and generate customised itineraries and tailored recommendations • Expedia use an AI assistant (Romie) to analyse user preferences and past behaviours to suggest tailored travel options and streamline booking processes. • Tokyo Haneda Airport uses AI-powered translation devices to assist travellers through real-time translation
Operations management (including logistics, sourcing, procurement, networks, and supply-chain management)			
• Data analytics on contract management and strategic sourcing. • Smart logistics and real-time tracking – across the supply chain and the customer journey (e.g. autonomous vehicles, smart roads, smart baggage handling, managing tourist flows, real time communication and navigation to tourists). • Seam travel and border crossing through facial recognition (e.g. simplified visa and entry procedures, security and boarding, check-in).	• Enhances operational sustainability, efficiency and reduced environmental impact through better resource allocation (e.g. circular practices, food, waste management). • Improves risk management and responsiveness. • Optimises visitor flows and transport management by reducing congestion and waiting times through automated vehicle routing and seamless	• Highly relevant for destination and businesses that manage a complex supply chain or transport systems (including tour operators).	• Airports (e.g. Paris, Los Angeles, Vancouver and San Jose) use AI-powered facial recognition systems at checkpoints instead of boarding pass or passport controls • Assaia use AI software to analyse video streams to provide real-time data on airport apron activities and machine learning-powered predictions of flight departure times. • American Airlines, in partnership with Microsoft, use AI to optimise gate assignments and reduce taxi time, saving fuel, cutting costs, and lowering CO2 emissions. • Booking and Microsoft, AI assistant, developed AI-powered chatbots and virtual assistants to handle routine tasks and

• Predictive maintenance (e.g. robotised cleaning and sanitary inspection). • Automated services through smart devices (heating, lighting).	connections between sites and hubs, ensuring no delays and promoting greener mobility. • Improves safety conditions (less casualties, damages, and insurance cost).		customer service, providing instant responses to queries and assisting with booking processes. • Iberostar, food and waste tracking, use of AI in hotels to track food production and categorise waste. • Hilton Hotels and Iberostar both use AI to track food production and categorise waste in hotels. • Disneyland parks, IoT sensors for data collection, use of AI to analyse data collected from wristbands issued to hotel guests, in addition to numerous IoT sensors and cameras throughout the resort. • SmartGuide, AI-generated guides, use an AI model to generate destination guides adapted to each tourist • Northern Kentucky International Airport, AI-powered American Sign Language through sign language translation on screen for providing information.
Digital products			
• Enhancing accessibility, personalisation and content creation of virtual tours, tours of museums and cultural sites, if combined with virtual/augmented reality. • Creating interactive exhibitions or journeys, with interactive map and visual and sound. • Creating content, restoring artworks or cataloguing artefacts related to culture and heritage utilising generative AI. • Recreating historic sites with 'digital twins' and supporting the analysis of ancient documents and information (immersive/ virtual experience).	• Diversifying offer of culture and recreation services • Greater accessibility of content, culture and artworks.	• Relevant for businesses that like to promote digital tourism products to increase accessibility or product portfolio. • Tourism workers and managers need to be aware of emerging trends and skills required to handle digital products.	• Barcelona Zoo uses an AI-enhanced Chatbot designed for people with visual, auditory, and cognitive disabilities, or mental health disorders. • Pompeii, RePAIR project, use machine learning algorithms, robotics and 3D scanning to assist the restoration of Pompeii's artifacts and architecture • Notre-Dame Cathedral, Paris, Ai-powered modelling, use of AI to build a digital twin comparing a prior 3D scanning of the Cathedral's structure in order to elaborate rebuilding plans and solidify the structure

Source: OECD elaboration.

Annex B. AI diffusion across tourism sectors in Europe

Figure B.1. AI diffusion across tourism sectors in Europe: Applications, purpose and barriers
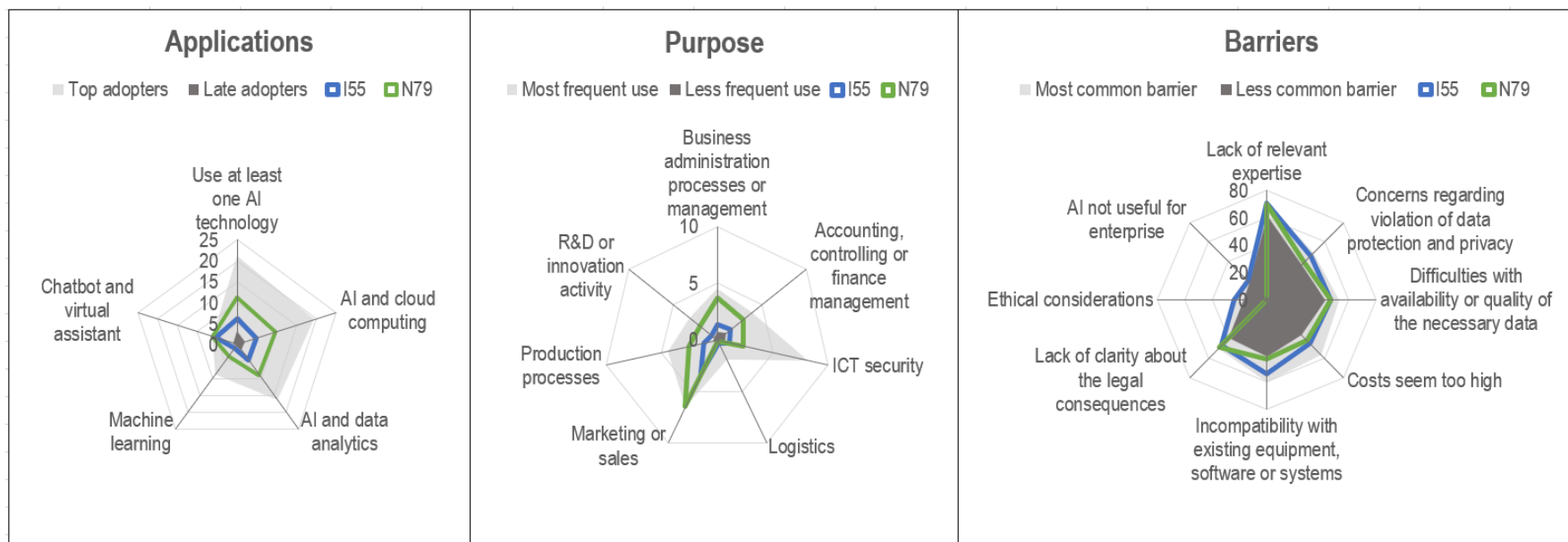
Note: Firms with 10 and more employees. Tourism services are proxied by I55: Accommodation; N79: Travel agency; tour operator reservation service and related activities (NACE classification). Excluding tech-savvy sectors like Information and communication technology; Computer programming, consultancy, and information service activities; Scientific research and development. Data for N79 on Ethical considerations and Usefulness of AI not available. Data for chatbot use are 2020.
Source: Authors, based on (Eurostat, 2024[51]; Eurostat, 2024[5]) ICT Usage in Enterprises. Artificial intelligence by NACE Rev.2 activity [isoc_eb_ain2].