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## DIGITAL TRANSFORMATION IN TOURISM

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**Abstract:** The development of new technologies has led to remarkable digital transformations in tourism. The appearance of tourist destinations, complexes, products, business experiences and ecosystems are changing. This necessitates the creation and development of new business relationships, business models and competencies in the tourism industry. Worldwide, digital travel sales will rise by 11.7 per cent this year to nearly USD 613 billion, and to an estimated USD 855 billion through 2021. Over the next 10 years, tourism is expected to create more than 5 million new jobs, and the number of tourists has to double over 2 billion. This paper examines the impact of digital technologies on tourism development. New opportunities are emerging in the leading trends in digital transformation in tourism are offered. Digital transformation and opportunities and it creates will be driving force for success of tourism industry in the future. Three key phases of technology development can be identified in tourism: sales and marketing, digital business ecosystems, systems integration. The digital transformation of tourism takes place in several directions: the use of artificial intelligence, blockchain technology, sharing economy platforms in tourism, internet of things, virtual reality, augmented reality, capitalise on voice search, customer experience, bleisure travel, etc. Challenges and opportunities for digitalization in tourism are aimed at creating new key initiatives: digital competences and skills, changing thinking, creativity and innovation, creating new relationships between consumers and producers, implementing new good practices, new value chains, facilitating personalization of tourists' experiences, securing funding, contributing to new destination configurations, improving infrastructure, political support, etc. Artificial intelligence will not be able to completely displace people from manufacturing and service sectors. The fact is that artificial intelligence is becoming more sophisticated and no one cannot predict what will happen when it ascends to the next technological level.

**Keywords:** tourism, technologies, digital transformation

### 1. INTRODUCTION

The dynamic changes and challenges call for a new business models and the growing competition in the tourism industry require a comprehensive review of current strategies and practices. Digitization plays a key role in this process. Digital transformation and opportunities and it creates will be driving force for success of tourism industry in the future. The developments of science and technology, the introduction of innovation have led to the emergence of new trends in global development. In this fast-paced process, the tourism industry is no exception. Experts outline various trends in tourism development related to digitalization in tourism: robots, chatbots and automation artificial intelligence, recognition technology, internet of things, virtual reality, augmented reality and others.

### 2. PHASES OF TECHNOLOGIES DEVELOPMENT

Three key phases of technology development can be identified in tourism<sup>100</sup>.

2.1 *Sales and marketing.*

2.2 *Digital business ecosystems.*

2.3 *Systems integration.*

Companies in the digital tourism industry are structured into three groups: 1) Technology providers who are the creators of key manufacturing technologies – robots, 3D printing, etc.; 2) Infrastructure and Services Providers – Clouds, Data Analysis, Virtual Modeling and Production, etc.; 3) Industrial consumers: Traditional manufacturers who apply new technologies and production systems, new business models, etc.

### 3. DIGITAL TRANSFORMATION IN TOURISM

The digital transformation of tourism takes place in several directions:

3.1 The Use of Artificial Intelligence – Artificial intelligence (AI) is another growing trend. For example, hotel travel websites can use AI to create a personalized proposal for their customers, and AI can help analyse business data. One of the other major areas where AI is used is through chatbots. The advantage here is that quick response time to customer inquiries can be guaranteed 24 hours a day, throughout the week, regardless of staff availability. In addition to chatbots, AI is becoming increasingly important to the travel industry because it

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<sup>100</sup> Xiang, Z. And D. Fesenmaier, D. (2017) *Big data analytics, tourism design and smart tourism. In Analytics in Smart Tourism Design: Concepts and Methods.* Springer, 299-307.

helps personalize experiences, find and book trips. AI is increasingly valuable in contexts such as smart hotel rooms, determining the likely needs and preferences of guests. Artificial intelligence finds applications everywhere – from customer service to security. Future trends in AI tourism include self-driving vehicles and virtual drivers. One of the most exciting technological advances in the tourism industry in recent years is the increased use of robots – from text chatbots and robotic reception assistants to security robots. The use of robots, chatbots and automation is a new trend for working with tourism staff. Interactive robots are assigned specific obligations for welcoming, serving food and drinks to visitors. This type of application is not the only one. Today, many tourists book their travel and overnight stay using internet chatbots, specially tailored AI, and more. For example, the concierge robot at the Hilton hotel chain.

Other hotels use robots to process inquiries and assist customers with useful information when the human factor is limited. Applications of robotic technology are gaining popularity in the tourism industry, and this is linked to changing consumer habits in the tourism industry as a whole. Increasingly, customers are looking for self-service methods and this makes the automation provided by robots attractive to hotels, travel agents and other businesses. In terms of actually providing excellent customer service, robots offer several benefits to hospitality companies. For example, chats can be accessed 24 hours a day with an almost instantaneous response that would be virtually impossible for human staff:

- *A Robot-Staffed Hotel* – The Henn-na Hotel in Nagasaki, Japan, is recognized as the world’s first hotel with robots, using robots at the reception, as customer information and storage points, using voice, face recognition and AI technology. The world’s first robotic staff hotel to open in Japan, near Nagasaki. The owner of the hotel, Hideo Savada, called it “HennnaHotel” – In Japanese, “The Strange Hotel”;
- *Connie, Hilton’s Robot Concierge* – Hilton have implemented the Connie Robot, an artificially intelligent concierge developed in collaboration with IBM. Connie is able to communicate with visitors using speech recognition technology to answer their queries. HMSHost launched a pilot program with Soft Bank Robotics America in 2017 to deploy the Pepper robot to its first North American location at Auckland International Airport to provide a fun and informative guest experience. Travelers can expect to see more than 4 feet of humanoids. The robot welcomes guests to airport restaurants, provides menu details, and even offers recommendations from it;
- *A Staff-less restaurant in Beijing* – in 2018 robotic, staff-less restaurant in Beijing opens for the first time in the world with robot chefs and waiters is open. Haidilao International Holding Ltd. owns a hot pot restaurant chain and partnered with Panasonic Corporation<sup>101</sup> to create the automated eatery. Haidilao plans to expand to 5 000 locations around the world in the future.
- *Travelmate: A Robotic Suitcase* – is one of the most innovative applications of robots in the travel industry is Travelmate – a robotic suitcase. The suitcase was able to trace its owner alone, using technology for collision avoidance and can rotate up to 360 degrees, etc.;
- *Robot Assistants for Hotels and Airports* – hotel robotic assistants fundamentally change the experience of tourists which can ask these assistants questions, find information, and even make them perform key tasks, such as room service, for example. Many of these robotic assistants are also able to understand and communicate in many languages;
- *Robots in Travel Agencies* – the other area in which robots are experimenting is with travel agencies, especially as a means of entertaining customers in busy times. Used in this way, robots are able to gather important information about what customer is looking for and then return it to travel agent, improving work efficiency;
- *Chatbots for Flight or Hotel Bookings* – Online bookings made revolution in tourism, now chatbots have the same application. One particularly good example of this is SnatchBot booking travel template, which uses AI to guide customers through the booking process by asking smart questions;
- *Security Robots for Airports* – to improve airport security robots are placed at different location to assist security officers. For example, Knightscope robots are used at some airports for the purpose of detecting concealed weapons and other prohibited articles in flight;
- *Other Examples of Robots in the Travel Industry* – there are various other applications for robots in the tourism industry. These include economy robots, luggage robots that can orient tourists to hotels and provide them with the services they need. Many current robots are receptionists who handle registrations and departures, which make much more enjoyable stay.

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<sup>101</sup> Ivanova, L. et al. *Cutting-edge technologies and innovations in the tourism*. Youth forum “Science, Technology, innovation, business – 2018”, 48-51, 2018. ISSN 2367 - 8569

### 3.2 Blockchain technology and its ability to transform the tourism industry are very high.

Blockchain tourism aims to shape the platform for management and control key and additional services by reducing transaction costs and increasing the confidence of the parties which involved.

Blockchain technology is a list of public records, also known as a “public ledger”, where transactions between the parties are listed or stored. Any entry known as a “block” in blockchain terminology is protected by cryptography. The most important aspects of blockchain technology are that data is decentralized and information is shared across a partner network. Each block contains transaction information and a time stamp.

The blocks are also permanent and cannot be modified without consensus across the network and without changing any subsequent blocks.

In regard to blockchain application in tourism industry, the benefits that blockchain technology can offer for tourism industry are: security and stability. The decentralized nature of blockchain means that information can never be “offline” or lost through accidental deletion or malicious cyberattack, ensuring that **transactions are always traceable**. The benefits of blockchain are: (1) Tracking luggage; (2) Identification services; (3) Secure, traceable payments; (4) Customer loyalty schemes. Blockchain can transform the tourism industry. Some more specific examples can be given:

- LockChain works as a direct marketplace for hotels and businesses which looking to rent. The platform covers various other aspects of **reservation process, payment**, property management and more. The advantage is that a decentralized system is used; there are no intermediaries, no commission. **The highest quality and security of reservations is guaranteed, and data themselves are resistant to modifications and unwanted tampering.**
- BeeToken / Beenest are one of Blockchain’s most innovative current applications. BeeToken or Beenest is home sharing platform. This technology is used to connect customers with owner, so you can organize and pay for your stay at the best and most enjoyable way. There is no commission, and payments, reputation and arbitration protocols ensure **consumer safety**;
- Winding Tree is a blockchain baggage tracking platform and also includes a reservation item. The lack of participation of third countries means that booking **and tracking can be achieved easily, safely and securely, all processes benefit from great transparency**;
- ShoCard & SITA is a project to build a platform for a decentralized identification database, using a standard format so that travel companies can **check customers’ identities quickly and easily**;
- Trippki is a customer loyalty system. Customers and hotel chains are in direct contact. All customers who meet requirements are allocated “**Markers Trip**” to stay in hotel. These symbols are permanently stored in the blockchain, which means that they do not expire and can be used at any time;

### 3.3 Sharing Economy platforms in tourism – sharing economy is changing the tourism industry

Tourism services have traditionally been provided by businesses such as hotels or tour operators recently, a growing number of individuals are proposing to share temporarily with tourists what they own. For example, their house or car or what they do – eating meals or excursions. This type of sharing is referred to as the ‘**sharing economy**’. There is a boom in the tourism industry as travel becomes more affordable and affordable in the long run. Much of this revenue comes from tourism-related sectors, in particular the accommodation and transportation sectors. This transition to freelance or digital nomadism opens up the sharing economy to P2P apps, such as TaskRabbit where users complete tasks for money without the need of a work visa as they travel.

#### **Types of platform’s**

- **Accommodation** – Airbnb, Homeaway, 9Flat, Wimdu, FlipKey, etc.:

*Airbnb* – online platform where people can bookrooms / accommodation and travel experiences (e.g. excursions). The basic idea behind Airbnb is not new: it helps those who want to provide short-term rentals to get in touch with those who want to rent these spaces (tourists, people who have just moved to a new city, etc.).(...) ‘travelling on Airbnb results in significant reduction in energy and water use, greenhouse gas emissions, and waste, and encourages more sustainable practices among both hosts and guests’<sup>102</sup>.

- **Transport** – Uber, Homeaway, Shaicle, Grab, etc.:

*Uber Technologies, Inc.* is an American multinational ridesharing company offering services that include peer-to-peer ridesharing, ride service hailing, food delivery, and a micro mobility system with electric bikes and scooters. The company is based in San Francisco and has operations in over 785 metropolitan areas worldwide. Its platforms

<sup>102</sup> Juul, M. (2017) *Tourism and the sharing economy*. EPRS, p. 3.

can be accessed via its websites and mobile apps. As of 2019, Uber is estimated to have 110 million worldwide users<sup>103</sup> a 69% market share in the United States for ride-sharing, and a 25% market share for food delivery.

*Shaicle – Share-a-vehicle social platform*

The first Fr2Fr (friend-2-friend) share-a-vehicle social platform in the world – Shaicle<sup>104</sup>, is a project of Bulgarians. This was reported by Ivan Georgiev and Peter Gruev, who are behind Shaicle. The two Bulgarians have interesting experience in the IT field and in the sustainable business. **It's free, it's social and it's environmentally friendly.** Each car ignition emits 1.5 kg of CO<sub>2</sub> for every 10 km you drive. Sharing a car with a friend reduces emissions by half. The mobile app for free travel sharing between friends in Shaicle's urban environment (abbreviated as “share-a-vehicle”) can be downloaded and used for free on Android and iOS mobile devices.

- **Dining** – VizEat, EatWith, etc.;
- **Travel experiences** – Vayble, ToursByLocal, iLoveBulgaria (the internet platform and mobile application – GPS & QR scanner), etc.

The business models of the Sharing Economy are usually platform-based to match demand and supply. The increasing use of the internet and its possibilities enable online platforms that are easy and cheap to access. Independent of the rest of the design of these non-traditional businesses, the Sharing Economy companies usually provide these platforms. These, in turn, attract demand, often on a very large scale, since they are accessible worldwide<sup>105</sup>. For example, peer-to-peer (P2P) car sharing services.

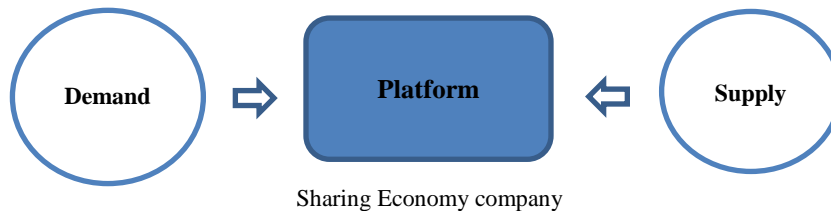


Figure 12. Structure of peer-to-peer model<sup>106</sup>  
Source: V. Demary, 2015

- 3.4 TUI Bed-Swap launches its own internal blockchain project called Bed-Swap. Using this technology, company is able to move inventory between different points of sale with **flexible sales margins**, in real time, based on the level of demand. Recognition technology is one of those increasingly important trends in travel and tourism that are beginning to enter in various fields. One of the first applications of traveller recognition technology is at border crossings in some countries. This process is also linked to the reading of the passport or identity card of the passenger and is mapped to the passenger's face using a camera and face recognition technology. Recognition technology is considered to be one of the big trends in the tourism industry. For example, voice recognition is gaining in popularity as a method of controlling in “Smart” hotel rooms.
- 3.5 Internet of Things (IoT) – IoT devices are “machines” equipped with a microprocessor and a certain form of digital connectivity that allows them to connect and be controlled by the Internet. IoT devices can integrate heating and cooling systems in hotel complexes and more. They are also common in modern hotel rooms. IoT is also used to integrate tourism services, facilitating hotel bookings, and room service or car rentals – through a hub or smartphone app. There are smartphone apps with which customers can browse the menu, create custom orders and pay for their food via the phone.
- 3.6. Virtual reality (VR) is a virtual reality technology that offers new opportunities for tourism management. VR tourism trends include high-end entertainment apps. VR sports are also becoming more and more popular in extreme sports such as skiing or snowboarding, hang gliding and more. VR allows tourists to “visit” virtually inaccessible destination – for example, canyons, caves, waterfalls, archaeological sites and others.
- 3.7. Augmented reality (AR) – In the travel industry, AR smartphone apps provide useful information to tourists about the destination they can visit – famous tourist sites and attractions, museums and galleries of hotels, entertainment venues, tasting rooms and more. For example, museums are increasingly using AR, which allows tourists to view historical exhibits in their authentic / original form through virtual overlay or use virtual maps with activated internet.

<sup>103</sup> <https://www.statista.com/statistics/833743/us-users-ride-sharing-services/>

<sup>104</sup> <https://www.shaicle.com/>

<sup>105</sup> Demary, V. *Competition in the sharing economy*, 2015, p. 5.

<sup>106</sup> Ibidem

3.8. Capitalise on Voice Search – Hotels are increasingly using smart hubs to offer voice search capabilities in rooms, providing a more convenient source of tourist information. In the meantime, travel agencies also make it easier to book entirely through voice control. In addition, voice search can be used to connect customers with a chatbots.

3.9. Customer Experience – The experience of tourists is always valuable for the development of the tourism industry. New technologies are increasingly improving the experience of tourists. The rate of last-minute travel has been steadily increasing. Business commitments, security and job retention are strong enough arguments for these attitudes. It is this trend that enables tourists to book from the web interface as easily and pleasantly as possible for their last-minute trips (last in time).

3.10. Bleisure Travel combines leisure and tourism with business travel. The customer who travels for work, decided to engage in tourism during their stay. Another increasingly popular set of trends is the bound phenomenon “digital nomad” in which employees participate in online travel. For example, the company Vision systems wants to turn the windows of airplanes in screens on which passengers can obtain flight information, to order food and drinks and shop.

Altran, a Paris-based company, invented a cyborg waiter who accepted a drink and food order in advance and then delivered it to the passenger. The self-driving trolley also collects waste at the end of the flight<sup>107</sup>.

#### 4. CONCLUSION

Tourism is a key component of the global and European economy and will continue to be so in the future. There are over 2.3 million SMEs in tourism in Europe, estimated to employ around 12 million people directly.

A major transformational force in the tourism sector is the digital economy, leading to a new phase of growth and development in Europe’s tourism regions. Digitization provides tools, frameworks and technologies to create and / or add value to tourism products and experiences, but the success of digitization depends on the capacity of tourism sector to share, learn and collaborate<sup>108</sup>.

**In this context, Europe responds to the challenges by:**

- 4.1 Promoting the 4.0 Industrial Revolution as a European idea for attracting investment in smart manufacturing;
- 4.2 Building a Digital Single Market;  
Free movement of information;
- 4.3 Standardization – cybersecurity, AI, IoT, 5G, cloud, etc.;
- 4.4 Promoting innovation – € 462 million for the Horizon 2020<sup>109</sup> Innovation Hub Network, with € 5 billion for regional and national subsidies;
- 4.5 Creating a dynamic digital environment through the I4MS (ICT Innovation for Manufacturing SMEs) Initiative;
- 4.6 Others at national level.

This research has shown that digitalization is well received and is beneficial for business owners in the tourism industry. However, employees may consider that their jobs to be at risk and sabotage the use of robots in company. Therefore it is better these technologies to be implemented in such activities that will facilitate the work of employees and not replace them completely<sup>110</sup>.

Artificial intelligence will not be able to completely displace people from manufacturing and service sectors. The fact is that artificial intelligence is becoming more sophisticated and no one cannot predict what will happen when it ascends to the next technological level. But this does not mean that instead of people on the streets, they will be walking machines. At least for now there is no such prospect.

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<sup>107</sup> Dredge, D. et al. (2018) *Digitalisation in Tourism. In-depth analysis of challenges and opportunities*, p. 6.

<sup>108</sup> Ibidem, p. 33.

<sup>109</sup> European Commission. (2014) *Horizon 2020. The EU Framework Programme for Research & Innovation*. ISBN 978-92-79-33057-5 doi: 10.2777/3719

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