THE RELATIONSHIP BETWEEN BIG DATA-DRIVEN TECHNOLOGIES AND PERFORMANCE MANAGEMENT STRATEGIES APPLIED TO COMPANIES IN THE HOSPITALITY, TOURISM & TRAVEL INDUSTRY

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Abstract
In this paper we will discuss about big data-driven technologies that the tourism industry has adopted along the way, especially in recent years, as well as the top trends based on artificial intelligence that radically transform travel in the future. The big data-driven technologies of the future in the tourism industry, which are essentialy based on artificial intelligence - AI, augmented reality - AR, Machine Learning - ML, virtual reality - VR and the Internet of Things - IoT, are those that have dictated new trends in efficient management strategies at the level of companies operating on the tourist market. Here we

tried to bring arguments, with figures and statistical data taken from international statistics, but we also appealed to the opinions of several authors from around the world who wrote in the last years in their articles published in prestigious international journals on the impact of new information technologies on increasing the turnover in tourism, increasing the sales of tourist packages, diversifying the tourist offer to customers or easier ways to find the perfect destination, to make a reservation easier or to pay for a tourist service in much more advantageous and faster conditions. All this represents the role of companies' efforts and their strategic management, which is more efficient and adapted to the requirements of the constantly moving and evolving market, a tourist market that has largely moved to the online environment and is increasingly helped by software and robotization transformations, such as virtual assistants, computer programs for image analysis, search engines, imaging recognition systems, robots, autonomous cars, drones or IoT. However, it can be seen that despite the promise made by AI, many travel companies do not realize yet the full potential offered by big data-driven technologies.

Keywords: *tourism; high-performance strategic management; information technologies; artificial intelligence – AI; augmented reality – AR; Machine Learning – ML; virtual reality – VR; Internet of Things – IoT.*

JEL Classification: Z32

Introduction

The tourism and travel industry is radically affected by the Internet and mobile technologies. Here are some of the important changes that will occur in the travel industry in the near future. In 2018 there were 4 billion Internet users, of which over 3 billion using social networks. In this context, an important thing to emphasize is that in influencing user decisions, friends are twice as influential as celebrities and opinion makers.

Information technology is becoming a basic component in the field of tourism, where adaptation to new information technologies is achieved at an accelerated pace. We expect in the coming years a massive impact of deep learning technologies and chatbots systems.

Also, virtual assistants for making reservations (for airlines and hotels) will become a common element in the tourism industry. We will be increasingly discussing real-time travel assistance, based on artificial intelligence – AI.

Modern tourism also needs modern technologies. In tourism, you must always keep up with all the latest technology to have satisfied customers. The use of AR, VR or IoT, AI or voice search has become essential for premium services offered to tourists passionate about information technology.

In tourism, the interaction with each client is important. A satisfied customer will return to an accommodation unit, will visit that place in other seasons, on other occasions. In order to meet the expectations of customers and their requirements, tourism actors have had to adapt and learn to use and make available to those who cross the threshold several modern technologies.

In fact, Big Data Technologies is the software used that incorporates data extraction, data storage, data sharing and data visualization, the comprehensive term includes data, data framework, including tools and techniques used to investigate and transform data. In the high perception of anger in technology, it is widely associated with other technologies such as Machine Learning, Deep Learning, Artificial Intelligence and IoT, which are much improved.

In our oppinion, Big Data technologies can be divided into two categories:

1.Big Data Operational Technologies, indicating the amount of data generated daily, such as online transactions, social networks, or any data from a particular company, used for analysis by software based on big data technologies. It acts as raw data to power big data analytics technologies. Some cases that describe Big Data Operational Technologies include booking tickets online for flights, railroads and more.

2. Big data analysis technologies, refering to the advanced adaptation of Big Data technologies, which is a bit complicated compared to operational Big Data. Real investigation of massive data, which is crucial for business decisions in tourism industry, is part of this technology. Some examples covered in this field are weather forecasting and time series analysis.

The revolutionary technologies that have changed the whole world and many sectors of activity have finally reached the important accommodation units in various countries. They have begun to change the way a hotel works, the way it is managed and the way communication between the client and staff takes place.

The tourism industry has adopted them on the fly and integrated them into the offers made to customers in order to develop an excellent experience every time tourists arrive in accommodation units and even before (Jahani, A., Kalantary, S., & Alitavoli, A., 2021).

The ability of artificial intelligence to perform tasks that have traditionally required human cognitive function has made it particularly useful for those in the

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travel industry, as implementing AI can save time and money for travel companies, while eliminating human error and enabling fast execution. of tasks at any time of the day (Lv, H., Shi, S., & Gursoy, D. , 2021).

Figure 1. Salient features of big data
Source: https://www.analyticssteps.com/blogs/top-10-big-data-technologies-2020

Most hotels and resorts rely heavily on providing excellent customer service to build their reputation, and AI technology can help with this in a wide variety of different ways (Mariani, M., & Borghi, M., 2021). For example, artificial intelligence can be used to improve personalization, adapt recommendations, and ensure fast response times, even in the absence of staff.

Artificial intelligence has advanced to the point where it is regularly used to assist and communicate with customers, "learning" from each of these interactions and thus improving future interactions. Moreover, AI can help with tasks such as data analysis, calculations and problem solving, all of which can be valuable to hotel owners.

1. Special Reviews

In recent decades, the impact of technology on travel has become even more significant due to the application of new IT services, leading to the growth of the online travel market and the increase of the digitalization of the tourism industry (Carlisle, S., Ivanov, S., & Dijkmans, C. , 2021). An important achievement in the past of the online travel experience dates back to the 1960s, when the first global distribution system (GDS) was introduced. GDSs are online networks that connect large service providers - such as airlines, hotels, or cruise lines - with service

providers, such as travel agencies and online travel agencies. By having access to basic provider data, such as the number of seats or hotel rooms available, GDSs allow distributors to access such information, helping customers book multiple travel services simultaneously. In 2019, the business segment of Amadeus distribution systems, one of the most famous GDSs in the world, generated revenues of approximately 3.5 billion US dollars. However, due to the impact of the pandemic coronavirus, Amadeus revenues worldwide on this segment fell sharply in 2020 (Marta, B., Melnyk, I., & Baran, R., 2021). Attacched we have a statistic of revenue of selected GDS from 2017, taken from Statista.ro. The global distribution system Amadeus generated a revenue of approximately 5.81 billion U.S. dollars (4.85 billion euros) in 2017. The revenue of Amadeus has been consistent between 2014-2017, remaining above 4.1 billion U.S. dollars. The revenue of Sabre on the other hand, has seen quite large growth, increasing by almost one billion U.S. dollars in the same period of time (please see Figure 2).
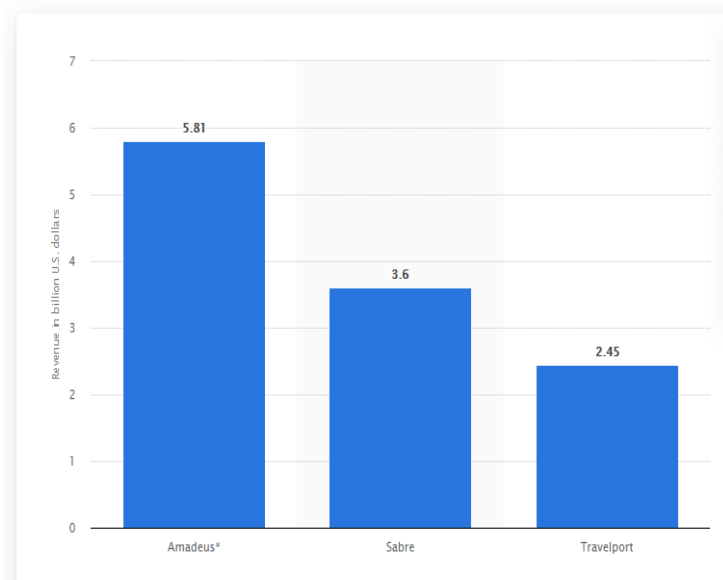

Figure 2. Revenue of selected global distribution systems in 2017 (in billion USD)
Source: https://www.statista.com/statistics/303916/revenue-of-the-leading-global-distribution-systems/
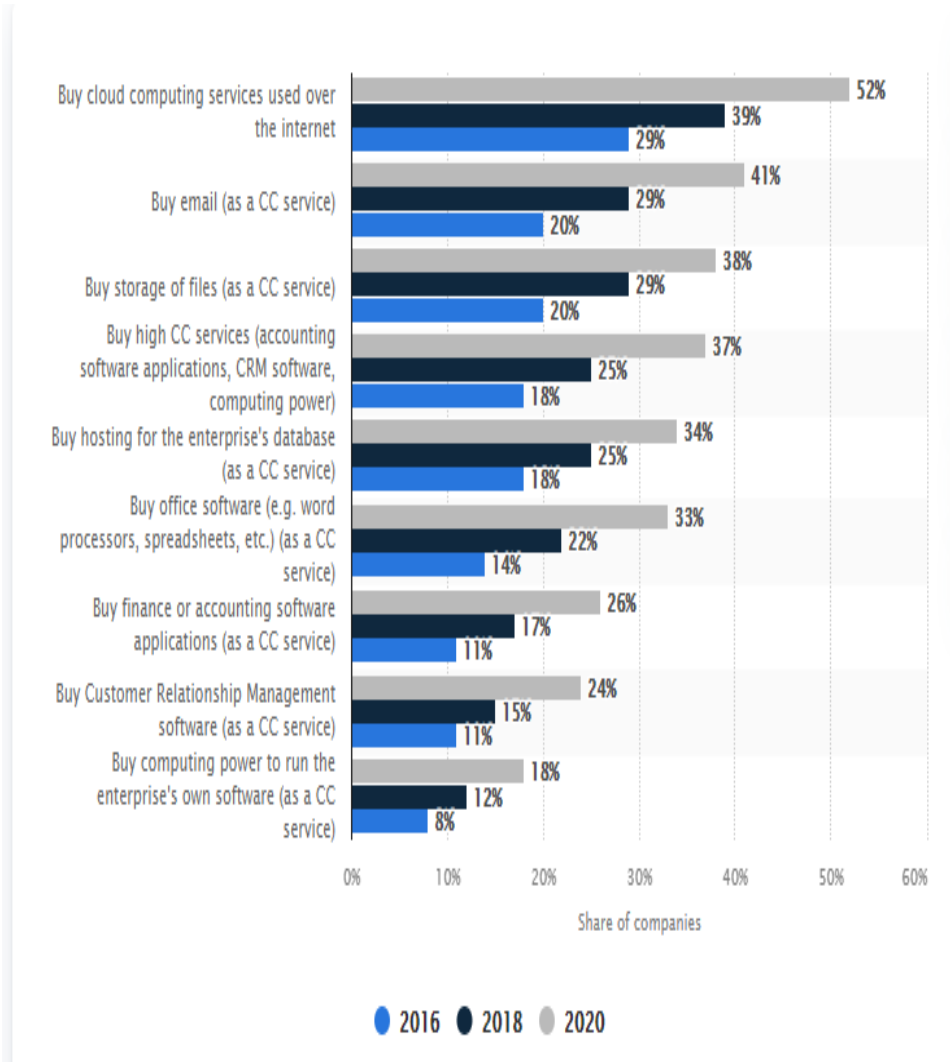
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Figure 3. Use of cluod computing services among travel agencies, tour operators and related activities in the European Union (EU27) from 2016 to 2020, by cloud service
Source: https://www.statista.com/statistics/1231753/travel-agencies-cloud-computing-services-eu/

Technological trends shaping travel and tourism include cloud computing, which is used to access, manage and store data online. According to a 2020 study, more than half of European travel agencies and tour operators bought used cloud computing services on the internet, while only 29% did the same in 2016. According to Figure 3, the use of cloud computing services among travel agencies, tour operators, and related activities in the European Union (EU 27) increased from 2016 to 2020. As of 2020, roughly 52 percent of travel agencies and similar enterprises in the EU bought cloud computing services used over the internet. Meanwhile, about 41 percent of surveyed companies bought emails (as cloud computing services) in that year.
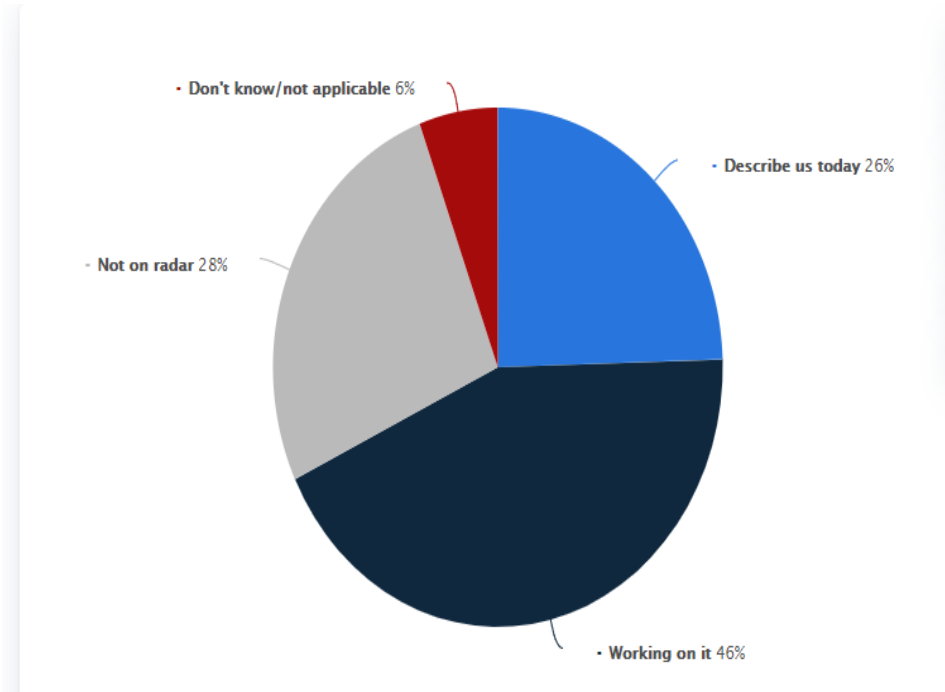

Figure 4. Usage of chatbots that enable guests to make general inquiries, bookings or similar services among travel and hospitality companies worldwide in 2020
Source: https://www.statista.com/statistics/1231768/travel-hospitality-companies-using-chatbots-worldwide/

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A December 2020 survey focused on the use of chatbots among travel and hospitality around the world suggested that this type of software could also play an important role in the future, with about 46% of the surveyed marketers and IT professionals claiming to be working to implement chatbots in the future to allow guests to ask general questions, to make reservations or for other similar services (see Figure 4). Virtual agents and chatbots were also among the main AI services implemented or planned by airports by 2022. (Huang, A., Chao, Y., de la Mora Velasco, E., Bilgihan, A., & Wei, W., 2021)

As the coronavirus pandemic (COVID-19) disrupted normal travel, interest in using information technology to revive travel and tourism has grown since 2020, as shown by the idea of introducing COVID-19 digital travel passports (Perić, M., & Vitezić, V., 2021). Global research in 2020 found that travelers from Thailand were most convinced that technology would be important in minimizing human interactions during the COVID-19 pandemic, while Germans were much more skeptical (Li, X., Law, R., Xie, G., & Wang, S.,2021).
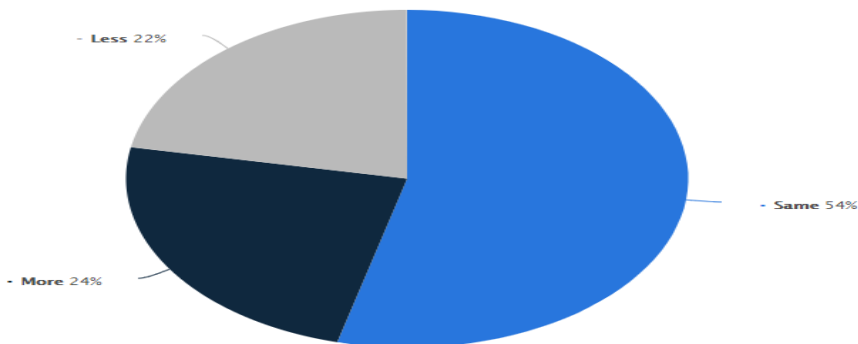

Figure 5. Number of Travel apps downloaded in 2018 compared to 2017
Source : https://www.statista.com/statistics/1050978/people-downloading-travel-apps-compared-to-previous-year/

In terms of technologies that would increase travel confidence, mobile apps that provide notifications and alerts during the trip, as well as contactless payments, were among the favorites, according to a November 2020 survey by Statista. When it comes to the future, technology is looking to be an important part of how we

function as a society. This also reflects on the travel industry, which is adapting to the new demands of the traveler by anticipating their future technological needs (Hu, M., Xiao, M., & Li, H., 2021). Mobile devices and the apps they run are a large part of these needs. According to the source, 24 percent of respondents downloaded more travel apps in 2018 than in the previous year. (see Figure 5)

2. **Artificial Intelligence - determining technology of the future in tourism**

Consumers of tourism services and the way they travel has changed a lot in recent years due to the increasing use of new information technologies. (Figure 6)
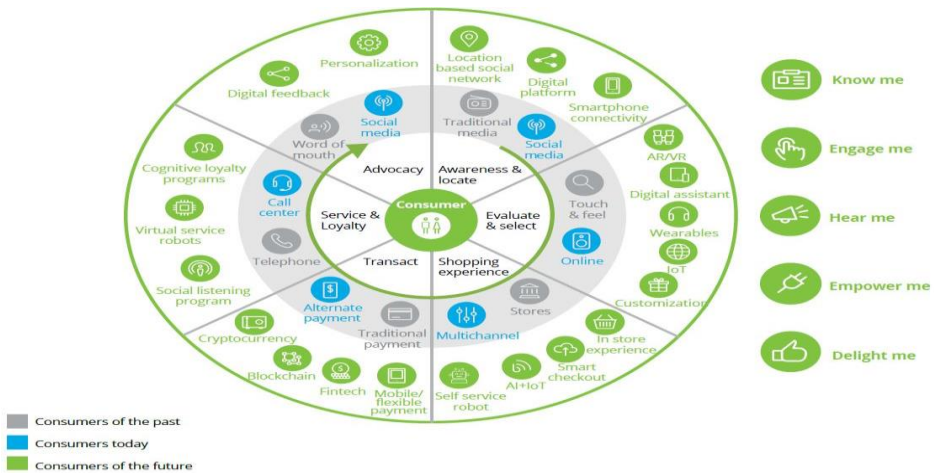

Figure 6. Big data-driven consumer insights
Source: Deloitte.com, Li, Harry Zhou, Future of consumer series: Big data-driven consumer insights

The need for people to travel faster, safer and more efficiently fueled the invention of extraordinary technological solutions. At present, it is more than obvious that the solution to get out of the current tourism crisis is to make massive use of Artificial Intelligence (AI) in tourism.

The concept of artificial intelligence or AI is often discussed, but it can be a little harder to define. In essence, it refers to computers or machines that perform tasks that would normally require human intelligence to perform them. This could

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be, for example, decision-making or speech recognition and interpretation (Vitezić, V., & Perić, M., 2021).

Artificial intelligence has been around for decades, but only relatively recently have computers, robots, and other machines become advanced and reliable enough to perform complex tasks without assistance. The concept of AI is strongly linked to the ideas of automation, in which the processes are carried out with little or no human intervention (Jabeen, F., Al Zaidi, S., & Al Dhaheri, M. H., 2021).

In the modern era, it is an accepted fact that tourism companies collect and store large amounts of data. This can help tourism companies enable AI intervention in its day-to-day operations so that data-enabled machines perform tasks ranging from data analysis and problem solving to speech translation, direct messaging, and improved personalization during the customer journey.
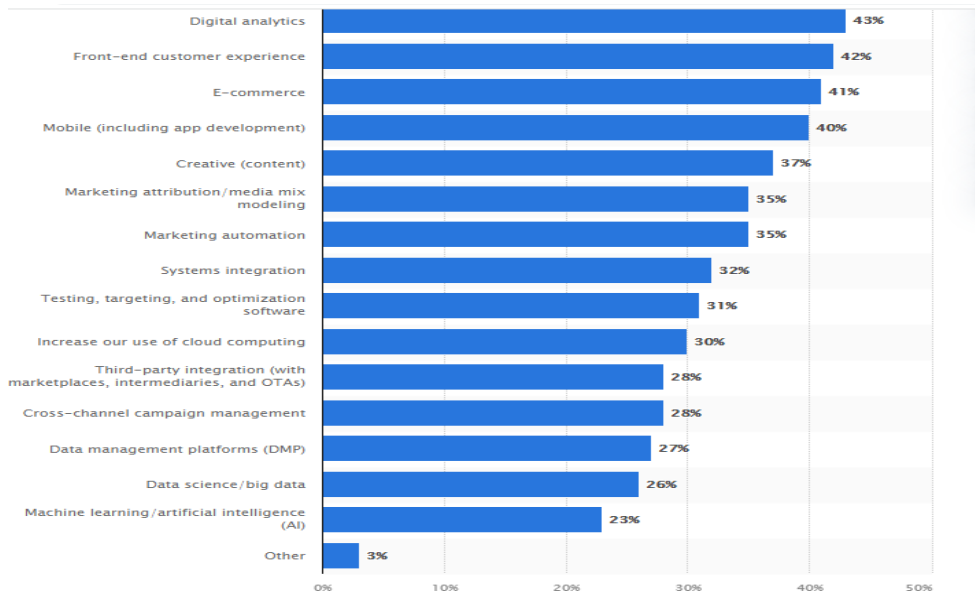

Figure 7. Main areas of digital strategy travel and hospitality companies are focus on over the next 12 month worldwide in 2020
Source: https://www.statista.com/statistics/1249384/digital-strategy-of-travel-hospitality-companies-worldwide/

The increasing speed of technological innovation in all industries has been a catalyst for the digitalization of the hospitality industry. In 2020, executives in the global travel and hospitality industry were surveyed on the areas of digital strategy that they would be focusing on most over the next 12 months. The majority of respondents, 43 percent, stated that they would be focusing most on digital analytics. Meanwhile, only 23 percent of respondents stated that they would be focusing on machine learning/artificial intelligence. (see Figure 7)

In what that follows we tried to emphasize the new technologies hotel guests wanted. As a result of the coronavirus (COVID-19) pandemic, many travelers have become more aware of the need to avoid health risks when traveling. In 2020, the share of travelers who believe accommodations will need to use the latest technologies to make travelers feel safe was 63 percent. During that same year, a poll was conducted to determine the global share of hotel guests who would use an app to open the door of their hotel room. The results indicated that a large majority of respondents, 73 percent, would prefer to use an app to open the door of their room. (see Figure 8)
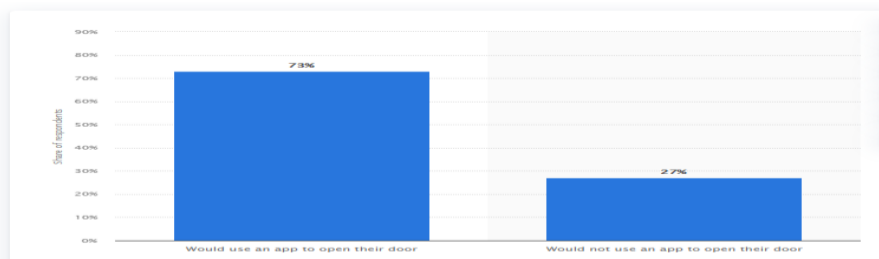
Figure 8. Share of hotel guests that would use an app to open the door of their hotel room worldwide in 2020
Source: https://www.statista.com/statistics/1189913/hotel-guest-app-usage-to-open-room-door-2020/

In 2020, the share of travel and hospitality companies with an individual or team directly responsible for digital transformation worldwide varied considerably. When surveyed, approximately 27 percent of respondents that were executives in the global travel and hospitality stated that their organization had a cross-functional team for digital transformation, while 16 percent of respondents stated that they either had a third-party partner, such as a consultant or agency, or no one responsible for digital transformation. (see Figure 9)

Figure 9. Main aspects of the guest experience hoteliers are looking to digitize worldwide
Source: Statista
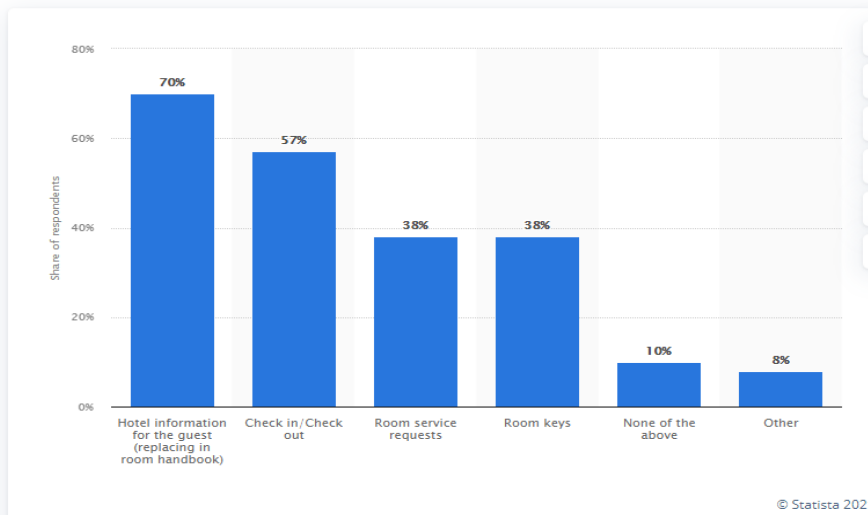
Over the past two decades, digitalization initiative of the travel and tourism industry has been seen increasingly across most industries worldwide. This has resulted in the emergence of the online travel market and a consumer demand for digital travel services. The online travel market includes services such as online travel agencies (OTAs) – which allow tourists to book travel services autonomously online – and travel review websites. Meanwhile, consumers are also looking to more digital experiences when they are traveling. This can include options such as virtual tours of a desired destination or accommodation, as well as mobile integration solutions, like using an app to check-in to a hotel room. The coronavirus (COVID-19) pandemic could also play a key role in accelerating the digitalization of this sector, with social distancing and hygiene concerns making consumers keener to use digital rather than in-person services. In this respect, a July 2020 study found out that more than 60 percent of travelers worldwide believed in the importance of technology to minimize human interaction when traveling .(see Figure 10)
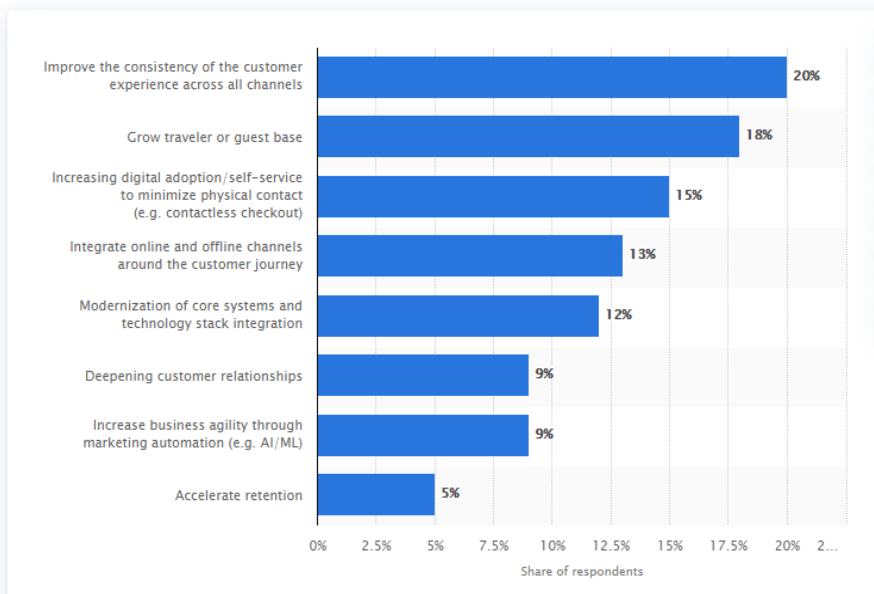
Figure 10. The main areas of focus for digital initiatives in a tourism company in the year ahead
Source: https://www.statista.com/statistics/1214169/digital-initiatives-in-the-tourism-industry-worldwide/

When it comes about share of mobile and digital sales in the travel and hospitality industry, we can raport to a Statista December 2020 study focused on the digital trends in the travel and hospitality industry worldwide. When asked about digital sales, roughly a quarter of the survey sample stated that mobile and digital sales accounted for 50 to 74 percent of their company's total sales in 2020. Meanwhile, 17 percent of respondents claimed that digital sales consisted of 10 to 24 percent of their organization's total sales in that year. (see Figure 11)

That is why artificial intelligence (AI) is considered the "technology that determines the future of tourism". In simple terms, artificial intelligence (AI) in tourism refers to systems or machines that mimic human intelligence in tourism decision-making, to perform various activities in the field of tourism, and which can be iteratively improved based on the information that collects them. In other words, AI in tourism is the ability of a machine to imitate human functions in the

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tourist area, such as reasoning, learning, planning and creativity (Vitezić, V., & Perić, M. , 2021).
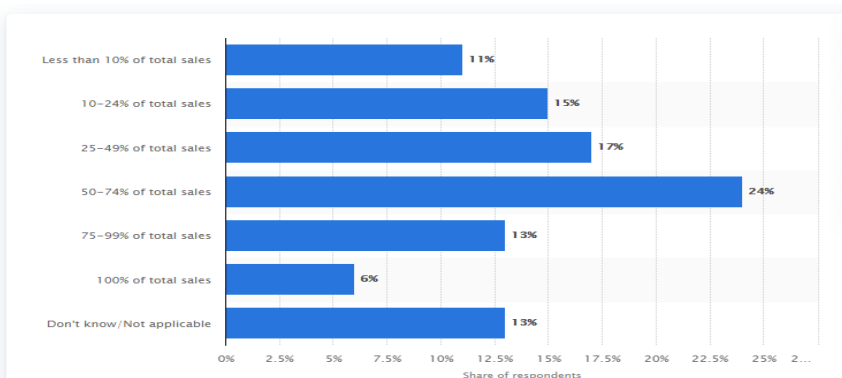

Figure 11. Percentage of sales in a tourism company generated by mobile and digital channels
Source: https://www.statista.com/statistics/1214295/mobile-and-digital-sales-in-the-global-travel-and-hospitality-industry/

AI adapted to the tourism industry allows technical systems to perceive the environment in which it operates, to process this perception and to solve problems in the tourism field, acting to achieve a certain objective imposed by a tourism company. The computer receives the tourist data (already prepared or collected through its own sensors, such as a video camera), processes it and reacts. The AI systems in tourism are able to adapt, to a certain extent, their behavior, analyzing the effects of previous actions and operating autonomously.

IA refers more to the processes and functionalities for thinking and analyzing extraordinary data from the tourist area, than to a certain format or function. Although AI inspires images of high-performance, human-looking robots that will conquer the world, AI is not meant to replace human beings in tourism. Its purpose is to significantly increase human capacities and contributions to tourism in general. This makes AI a very valuable asset for business in the tourism sector.

AI has become a generic term for applications that perform complex tasks that once required a human contribution, such as online communication with customers or the game of chess. The term AI is often used interchangeably with its

subdomains, which include machine learning and in-depth learning. However, there are differences between these terms. For example, Machine Learning (ML) focuses on building systems that can learn or improve their performance based on the data they process. Although all Machine Learning systems are AI, not all instances of AI are Machine Learning. (Le, T. H., Arcodia, C., Novais, M. A., & Kralj, A., 2021).

To get the full value from AI, many tourism business managers make significant investments in data science teams. (Tsuda, H., 2021). Data science is an interdisciplinary field that uses scientific and other methods to extract value from data, combining functionalities in areas such as statistics and computer science with business knowledge, to analyze data collected from multiple sources.The travel industry is adapting to the new demands of the traveler by anticipating their future technological needs. According to the Statista source, 68 percent of travel brands will reportedly be investing in business intelligence or predictive analytics by 2019, while the remaining 32 percent of travel brands do not intend to do so. Who will have made the right decision? We will have to wait and see. (See Figure 12)
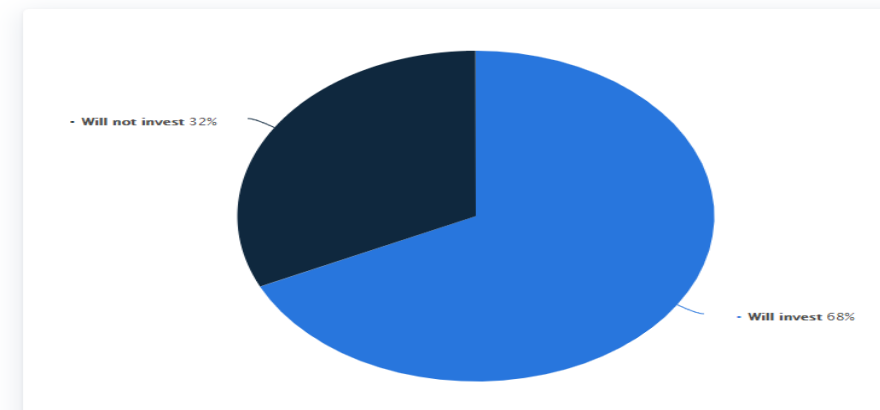

Figure 12. Share of travel brands that want to invest in business intelligence or predictive analytics in 2019
Source: https://www.statista.com/statistics/1050953/business-intelligence-predictive-analytics-travel-brands-investing/

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AI technology improves the performance and productivity at the management level of a tourism company, by automating processes or activities that once required human intervention. AI can also give meaning to data on a scale that no human has ever been able to do. This functionality can bring substantial benefits to the tourism business. For example, many travel companies around the world use machine learning to provide a level of customization that helps companies grow their customer base by more than 25% (Le, T. H., Arcodia, C., Novais, M. A., & Kralj, A., 2021).

Most travel companies have made data science a priority and are investing heavily in this area. Managers of many travel companies around the developed world have ranked analysis and business intelligence as top technologies for their organizations. They see these technologies as the most strategic for their companies and therefore they attract the latest investment.

AI has a significant value for most functions, businesses and fields of activity in the field of tourism. This includes general and tourism-specific applications, such as:

• Using transactional and demographic data to anticipate how much customers will spend during their relationship with a tourism business (or the value of the customer collaboration cycle)

• Price optimization based on customer behavior and preferences.

Based on the findings of a study conducted by Harvard University professors - Harvard Business Review, tourism organizations mainly use AI for:

• detect and deter security breaches (44%)

• solve users' problems related to technology (41%)

• reduce the activity of managing tourist packages or flights (34%)

• to evaluate the internal conformity in the offer of tourist packages by the approved and approved tourist agencies (34%)(Joe McKendrick, 2021).

The role of artificial intelligence in the business world has grown dramatically in the last decade, and in recent years, in particular, they have been adopted and much more widespread, including in the tourism industry. Below are the most significant ways in which information technology is currently implemented in the field of tourism (Zhang, F., 2021).

The most important types of AI used in the tourism industry generally refer to:

1. Software: virtual assistants, computer image analysis software, search engines, imaging recognition systems

2. Built-in AI: robots, autonomous cars, drones, the Internet of Things (Chen, S. X., Wang, X. K., Zhang, H. Y., Wang, J. Q., & Peng, J. J., 2021)

Those who develop artificial intelligence for the tourism industry have the following major directions of action regarding the part of Software IA:

• Communication with tourists through chat boxes. Chat bots use AI to more quickly understand the problems of tourism customers and to provide more effective answers to tourists' questions. Chat bots use natural language processing to understand customers, to ask questions, and to get information. These chat bots learn over time, so they can add more value to tourist interactions. (Zhang, Y., Li, G., Muskat, B., & Law, R., 2021). ChatBots and TravelBots are again very useful when customers want quick information and answers to typical questions. These little programs or scripts already have preset answers and are able to interact and turn into real tourist guides. For hotels and other companies in the tourism industry, one of the most interesting uses of artificial intelligence is to provide online customer support through Chatbots and Online Customer Service. In particular, it has already been widely adopted in order to feed chatbots on social platforms as well as instant messaging applications (Wang, N., 2022).

Used in this way, AI is able to answer questions and provide valuable information to customers, even when a customer service representative is not available. Customers are demanding faster and faster response time on online platforms, and artificial intelligence allows companies to deliver times that would be impossible for people.(Huang, B., & Hao, H., 2021).

Example: Sam, smart travel chatbot!

• Face-to-face customer service - artificial intelligence and speech recognition. While the use of artificial intelligence to power online customer service is now relatively common, one of the emerging trends is that technology is also being used for face-to-face interactions with customer service. Crucially, it has the ability to reduce queues at information or reception offices and to improve overall efficiency. An example of this technology in action is the AI robot "Connie", which was implemented by the hotel chain Hilton Palace Hotel. This robot uses artificial intelligence and speech recognition to provide tourist information to customers who speak to it. Each human interaction also helps to teach the robot, improving the quality of all future communications. Example: Meet Connie, the first Hilton Hotels concierge robot (Fleischer, A., & Felsenstein, D., 2004).

• Through Machine Learning (ML) the operations that involved the presence of a large number of people and their intervention are completely automated, there is

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no need for investment in training programs, there is no need for so much staff. Many tasks can be assigned to Machine Learning so that everything goes faster (Le, T. H., Arcodia, C., Novais, M. A., & Kralj, A., 2021).

• Smart assistants in the tourism area use AI to analyze essential information from large text data sets, but also to improve programming in tourism (Hamid, R. A., Albahri, A. S., Alwan, J. K., Al-qaysi, Z. T., Albahri, O. S., Zaidan, A. A., ... & Zaidan, B. B., 2021).

• Search engines can offer automatic recommendations to tourists for TV shows with a tourist touch, depending on the viewing habits of tourists (Mariné-Roig, E., 2017).

• Data center monitoring. IT operations teams in a travel company can save huge amounts of time and energy on monitoring systems by placing all data on web pages, applications, database performance, user experience, and logs on a single cloud-based data platform, which automatically monitors thresholds and detects anomalies.(Ali, F., El-Sappagh, S., & Kwak, D., 2019).

• Data processing and analysis. Performing business analysis without an expert. Analytical tools with a visual user interface allow people without technical knowledge to easily query a system and get an easy-to-understand answer. Technologies, applications and devices based on artificial intelligence (AI) in the tourism industry have long been highly mature in the tourism market. The possibilities and developments that are based on it generate heated discussions. Whether it is human-machine communication, the analysis of large volumes of data and texts or the assessment of situations: the use and capitalization of AI systems in the tourism industry is seen by analysts and IT market leaders alike as a decisive factor for sustainability and competitiveness of companies in the tourism industry. And yet, despite the clear potential and benefits of AI, its productive use in tourism companies and tourism business processes is still rarely found in comparison (Wu, L., Kang, J. E., Chung, Y., & Nikolaev, A., 2019).

Finally, it is important to understand that AI applications in the tourism and tourism industry are not limited to customer service. In fact, one of the most popular and effective uses is to collect and interpret data to draw conclusions about customers, business practices, and pricing strategies.

The key advantage of artificial intelligence in this particular field is its ability to sort huge amounts of data quickly and accurately, where the human equivalent would take much longer and could contain more errors. For example, the Dorchester Collection Hotel used AI to sort customer feedback from surveys,

reviews and online surveys and to build a clearer picture of current opinion in real time (De Carlo, M., Ferilli, G., d'Angella, F., & Buscema, M., 2021).

Many travel companies are now wondering how they can use the technical possibilities of artificial intelligence to create values in the field of tourism and what is the right way to start to gain the necessary experience in the tourism industry.

Starting from the particularities and requirements of each tourist company, we can reflect the current possibilities of artificial intelligence and develop recommendations for action based on the analysis of utility and necessities.

In tourism, the 360 ° communication with the client, the analysis and the work with the documents, as well as the analysis and forecasts based on the data regarding the tourist packages are in the foreground (Zougagh, N., Charkaoui, A., & Echchatbi, A. , 2021).

From the AI category incorporated in the tourism industry we find robots. Robots are very useful in tourism, and if they have artificial intelligence they can improve quality and performance, reduce costs, offer the same quality services as when you already have qualified staff for those tasks. They can be at the reception in hotels, on planes, they can be the perfect housekeeper in hotel rooms and they don't even need a monthly salary and hours of rest. (Kazandzhieva, V., & Filipova, H. , 2019).

3. New information technologies adopted and developed in the tourism industry
3.1. Artificial Intelligence (AI) and Virtual Reality (VR) in the tourism industry - artificial intelligence program algorithms

New technologies have also appeared in the tourism sector, which hopes to take advantage of the "gold mine" of personal data online, through automated and customized hotel rooms according to customer preferences and virtual reality glasses that can be used as a tourist brochure. (Figure 13)

In the hotels of the future, there will no longer be receptionists, but a mirror equipped with the facial recognition function. Once the customer has been identified, the camera instantly adapts to all the wishes made by him during the booking procedure: temperature, bright ambiance, reproductions after Picasso or Van Gogh in digital frames hanging on the walls. Even the door lock is smart: it opens and closes via the Whatsapp application in the customer's phone. If some of the hotels already offer versions with simpler functions, that room, intended for

luxury hotels, integrates the latest discoveries in the field of voice recognition functions, allowing for example the customer to order pizza in 40 languages. The mattresses, equipped with sensors, record the smallest movements of the client, allowing hotel employees to bring him coffee immediately after waking up (Koo, B., Curtis, C., & Ryan, B., 2021).
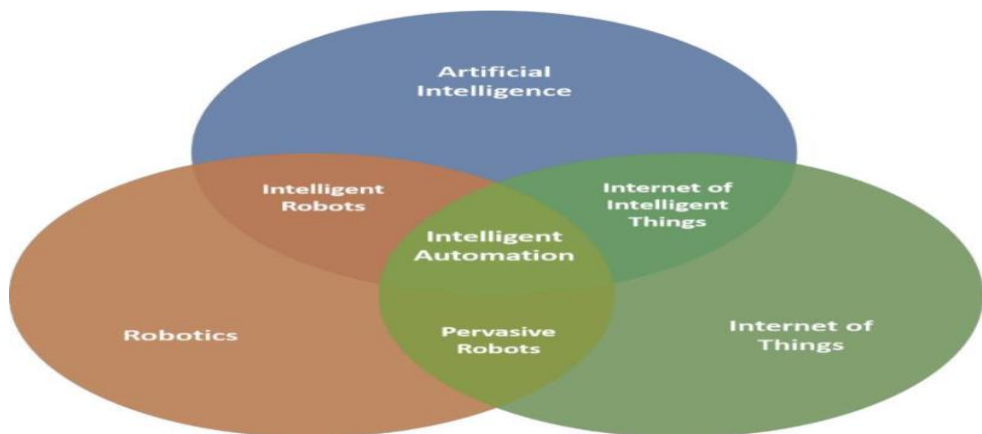
Figure 13. Automation in tourism industry
Source: Tussyadiah, I.P. (2020). A review of research into automation in tourism: Launching the Annals of Tourism Research Curated Collection on Artificial Intelligence and Robotics in Tourism. *Annals of Tourism Research, 81*, 102883.

Beyond the special appearance of these gadgets, artificial intelligence promises hotel managers an extremely intimate knowledge of customers. The technology will allow hoteliers to know the customer's needs before he becomes aware of them. This knowledge is reinforced by the personal data provided when booking online, but also after the customer arrives at the hotel, thanks to the "beacon" technology - authorized in some countries - which consists of a beacon that allows the detection of places where smartphones are in the hotel or in the city.

Fueled with that essential data about tourists, the algorithms of artificial intelligence programs identify the customer's habits, in order to retain him by giving him a tailor-made reception or by selling him additional products. If the algorithm knows that when you come with your wife to the hotel, you do not have dinner at the restaurant, but order dinner in the room, he will offer you a special

menu in the room and a bottle of champagne. But if you come with your family, it will offer you a discount on the children's menu. (Lee, M., Kwon, W., & Back, K. J. , 2021).

In addition, these technological tools can help improve productivity in the hotel. All purchases can be automated. For example, if a large group of Britons arrives, the system knows it will have to order more bacon.

The manufacturers of high-tech gadgets in vogue, virtual reality (VR) glasses, are also trying to enter the tourism sector. At the stands set up in the salons of some tourist companies, those interested can "visit" the streets of Marrakech or walk part of the route followed by the faithful during the pilgrimage to Santiago de Compostela.(Kusdibyo, L., Brien, A., Sutrisno, R., & Suhartanto, D., 2021).

At the moment, we are in a still incipient phase with VR technology in tourism. Although they are presented with virtual reality, industry professionals say 'what a wonder', but do not buy it. It is not yet one of the priorities in their marketing budget (Huang, M. H., & Rust, R. T. , 2021).

But, for example, the Palladium hotel chain, based in the Balearic Islands, has nevertheless embarked on this adventure: its managers no longer bring brochures to present their establishments in front of the representatives of travel agencies, but VR glasses. Video files are available for each hotel in the group, allowing you to visit rooms, pools and restaurants.(Flavián, C., Pérez-Rueda, A., Belanche, D., & Casaló, L. V., 2021)

Travel agencies know the hotels much better in this way and said that this device will help them to sell accommodation more easily, making sure that tourists appreciate the possibility to view the hotel rooms on a real scale. this makes it much more difficult to cheat with VR glasses. Although VR glasses are available at fairly affordable prices (between 50 and 600 euros), video files produced in virtual reality can cost from 2,000 to 150,000 euros. has already made several VR videos. Tourism is associated with experiment, with sensitivity. Virtual reality cannot replace the taste of local cuisine or the smell of the ocean. But it gives us the opportunity and the desire to explore more (Lu, J., Xiao, X., Xu, Z., Wang, C., Zhang, M., & Zhou, Y., 2021).

3.2.Augmented Reality (AR) and Virtual Reality (VR) in tourism.

The two modern technologies are used both in creating a marketing content and in improving the experiences that customers have in accommodation units or when choosing hotels, guesthouses, for example. Not only hoteliers use the two types of

realities to show tourists what the hotel rooms look like, but also the airlines. Many airlines already have VR inside the planes, so any tourist who wants to travel by plane to the holiday destination will see how comfortable his place is and how the atmosphere on the plane is. (Phaosathianphan, N., & Leelasantitham, A., 2021). This is how ticket sales increase, but also the trust in the company increases significantly. Travelers can see in advance what they will receive, evaluate, know what they like and what they don't and can quickly decide whether to choose that airline or not.

IoT (Internet of Things) in tourism. The Internet of Things is a relatively new concept, which presupposes the existence of an interconnectivity between several devices connected at the same time to the Internet and between them. Many companies in the tourism industry have realized the importance of IoT and have begun to actively use this concept and associated technologies. (Shaw, S., Rowland, Z., & Machova, V., 2021). For example, Lufthansa comes to the aid of tourists who are always afraid of losing their luggage at the airport and are stressed or anxious. With a single link accessed from the company's application, customers can immediately see where the luggage is in real time and can prevent any problems, so they are more relaxed. And in the hotel IoT is very useful and is already used in many parts of the world, so everything in a room, from the bar, refrigerator, lights, TV will be interconnected and easy to use without much effort (Kang, J., Guo, X., Fang, L., Wang, X., & Fan, Z., 2021).

3.3. Cloud computing in the tourism industry

The hospitality and tourism industry are ideal candidates for using cloud solutions. Although there may be a lot of other software packages as services available (SAAS), we focused exclusively on three basic applications: e-mail, web conferencing with communications and web portal hosting. To illustrate all the advantages of moving information from a tourism company to the cloud requires a few examples. From a breakfast to a separate hotel chain to a mc breakfast internationally and geographically; from an Indian casino to a multi-billion dollar Las Vegas resort; from a family-run restaurant to hundreds of cafes around the world; all channels in the hotel industry can benefit from the use of some form of cloud services.(Kapuruge, M., Colman, A., & Han, J., 2011, October)

Regardless of the type of business in the hospitality industry, cloud computing or SaaS can offer a wide variety of technology solutions and cost-effective ways to implement business applications. The key to implementing cloud technologies is to

research and educate business decision makers in choosing the right tools for business needs. Not every cloud solution is best for a company, but with any good technology comes the need to compare other products and make the right decisions. Cloud services are just one solution out of a wide range of options. (Kruja, A. D., Hysa, X., Duman, T., & Tafaj, A., 2019).

4. A performing type of strategic management in the tourism industry, based on the technologies of the future

4.1. AI - strategic imperative and competitive advantage in the tourism industry

AI is a strategic imperative for any tourism business that wants to achieve greater efficiency, new revenue opportunities and increase customer loyalty. It is fast becoming a competitive advantage for many tourism organizations. With AI, tourism organizations can achieve more in less time, create personalized and compelling customer experiences, and anticipate business results to boost profitability. But AI is still a new and complex technology. To get the most out of it, tourism company managers need expertise in how to build and manage scalable AI solutions. A successful AI project requires more than just hiring a data expert. To ensure the success of AI, tourism organizations need to implement the tools, processes and management strategies appropriate to their own activities (Ivanov, S. H., & Webster, C. , 2017).

4.2. The importance of AI for organizations and efficient management in the tourism industry

Some AI technologies have been around for over 50 years, but the increase in computing power, the availability of huge amounts of data in the tourism industry and the new algorithm have led to major advances in the AI industry in the tourism industry in recent years. Artificial intelligence is considered a central element of society's digital transformation and has become a priority for the EU (Vrbka, J., & Rowland, Z., 2019, April).

Future applications are expected to bring huge changes in tourism, but AI is already present in our daily lives in the tourism industry.

The central principle of AI in the tourism industry is to reproduce - and then overcome - the way people perceive and interact with the world. This is fast becoming the foundation of innovation. Supported by various forms of Machine Learning, which recognize data models to allow predictions, AI can add value to any tourism business by:

• providing a more comprehensive understanding of the abundance of available data

• Relying on predictions to automate certain activities in the tourist area that are overly complex or routine (Kazandzhieva, V., & Filipova, H.,2019).

4.3. Factors that stimulate the adoption of AI in the practice of efficient strategic management

The development of AI in the complex tourism activity is stimulated mainly by the following three factors:

• Economical pricing and high-performance computing features available immediately. The abundance of computing power in the cloud allows easy access to economical and high-performance computing power. Prior to this development, the only computing media available for AI were not cloud-based and had prohibitive costs (Cheng-Hua, T., Shyh-Jer, C., & Shih-Chien, F., 2009).

• Large volumes of data are available for training. AI must be trained on a large volume of data to make accurate predictions. The emergence of different tools for data labeling, the ease and accessibility with which tourism organizations can store and process both structured and unstructured data, allow several tourism organizations to build and train AI algorithms. (Oday, A., Ozturen, A., Ilkan, M., & Abubakar, A. M., 2021)

• Applied AI capabilities offer a competitive advantage. Tourism organizations are increasingly recognizing the competitive advantage of applying AI information to their business objectives and making it a priority at the tourism company level. For example, the specific recommendations provided by AI can help tourism organizations make better decisions faster. Many of the features and functionalities of AI can lead to lower costs, reduced risks, faster time to launch tourist offers on the market and much more. (Al-shami, S. A. H., Al Mamun, A., Ahmed, E. M., & Rashid, N.,2021).

And here are some of the common myths encountered by company managers about AI solutions for the enterprise environment in the tourism industry. While many travel companies have successfully adopted AI technology, there is also quite a bit of misinformation about AI and what it can and cannot do for a tourism industry company. Here are five common myths about AI in the tourism industry:

• Myth no. 1: AI solutions for tourism companies require a self-development approach. Reality: Most travel companies adopt AI combining internal and external solutions, ready to implement. The development of internal AI allows tourism

companies to adapt to unique business needs; pre-developed AI solutions allow tourism companies to streamline implementation with an immediately available solution to solve common tourism business problems.

• Myth no. 2: AI technology in the field of tourism will provide magical results immediately.

Reality: The path to AI success in tourism requires time, careful planning and a clear idea of the results that the tourism company wants to achieve. The tourism company needs a strategic framework and an iterative approach to avoid providing a random set of disconnected AI solutions.

• Myth no. 3: AI technology for tourism companies does not require people to run it. Reality: AI technology for travel companies does not mean that robots take control. The value of AI technology lies in the fact that it improves human capabilities and frees the employees of the tourism company, so that they can deal with more strategic activities. Moreover, AI technology needs people to provide the right data and work with it correctly.

• Myth no. 4: The more data in the field of tourism, the better.

Reality: AI technology for travel companies needs smart data. In order to obtain the most efficient information for the tourism business from AI, the data must be of high quality, up-to-date, relevant and enriched.

• Myth no. 5: AI technology for tourism companies only needs data and models to be successful. Reality: Data, algorithms and models are just the beginning. But an AI solution must be scalable to meet the changing needs of the company and the tourism market. To date, most AI solutions for companies operating in the field of tourism have been developed by data experts. These solutions require extensive manual configuration and maintenance and are not scalable. To successfully implement AI projects, any tourism company needs AI solutions that adapt to new requirements as the company progresses with AI.(Suvetha, M., Swathi, S., Rani, M., Vinoth, S., & Suriya, R., 2018).

4.4. Creating the right organizational culture about AI in the tourism industry

Achieving maximum AI results in tourism and avoiding problems that slow down successful implementations require the implementation of a team culture that fully supports the AI ecosystem in tourism. In this type of environment:

• Tourism analysts work with data experts to define issues and objectives

• Data engineers manage the data and the basic data platform so that they are fully operational for analysis

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• Data experts prepare, explore, visualize and model data on a data science platform

• IT architects manage the basic infrastructure needed to support data science at scale, either on-premises or in the cloud

• Application developers implement models in applications to build data-oriented products. Best strategic management practices to maximize AI in the tourism industry. (Imron, M. A., Munawaroh, U. I., Farida, R. D. M., Paramarta, V., Sunarsi, D., Akbar, I. R., ... & Masriah, I. , 2021).

Following the example of the Harvard Business Review, we believe that some recommendations can be made to start with AI at the level of a travel company:

• Applying the functionalities of AI to those activities in the tourism field that have the largest and fastest impact on the revenues and costs of a tourism company.

• Using AI to increase productivity with the same number of people, instead of eliminating or adding a number of employees.

• Start implementing AI in the back office, not in the front office (in large tourism companies, IT and accounting departments will benefit most from the support of AI solutions).

4.5. Adaptive intelligence in the practices of high-performance strategic management in the tourism industry

As AI functionalities in the tourism field have been transformed into mainstream operations at the level of a tourism company, a new concept is being developed: adaptive intelligence in tourism. Adaptive intelligence applications in tourism help tourism organizations make better business decisions by combining the power of real-time internal and external data with decision-making science and highly scalable computing infrastructure. These applications essentially make any tourism business smarter. This will allow tourism companies to offer their customers better products, recommendations and services, all of which produce better results in the tourism business. (Musavengane, R., & Woyo, E., 2022).

4.6. Structured, intuitive and efficient management of documents in the tourism industry

In the case of using systems for document management or for processing documents and procedures, users in the field of tourism periodically express their desire for very simple search options. Especially tourist users who work only occasionally with the systems or who frequently search through different contents

need a very intuitive search possibility. By using AI-based services in tourism, for example, possibilities can be offered for formulating a search desire in the natural language - and hence a search structured according to certain types of packages, destinations, vacations, small trips, etc. "Show me a Christmas tourist offer" can be uniquely identified by a trained component, as well as the introduction: "Send this holiday offer to tourist X for verification" (Stelnik, E. V., Kiyashko, Y. A., & Lysikov, P. I., 2019, March).

4.7. Super-applications: a great potential for business management to increase travel sales of tourism companies

The idea of a travel super-application has been circulating for some time. We believe that this idea will take shape in the next few years, for two reasons - the open source / API / partnership landscape means that it is possible to integrate all flows into a super-application, and customers in the tourism industry are getting used to this idea.

When booking.com asked 12,500 travelers from nearly 30 countries, 57% said they wanted "a single app for all your planning, booking and travel needs." (Mingrui, Y. A. N. G., & Eunyoung, K. I. M. , 2021, March).

To some extent, the super-application already exists in the Asia-Pacific region, where e-commerce and messaging companies such as WeChat, Alipay and Meituan in China, Line in Japan and PayTM in India have built multi-purpose applications from which users can buy and pay for flights and hotels in the same way you order packaged food, a taxi or buy a shirt (Han, Q., Novais, M. A., & Zejnilovic, L., 2021).

It should be noted here that travelers also like the idea of a super-application, so the tourism industry should start thinking about the best way to offer this.

4.7. AI technologies can increase passenger loyalty by demonstrating efficient management

Travelers live in a world where they use multiple devices and use a multitude of channels, where access to travel content is widespread and fragmented, where consolidation is low, and where value is more important than price. In this context, loyalty to a particular brand or destination, when there are so many alternatives just a click away - seems to belong to another era (Singh, B. , 2021).

But information technology can be used to encourage the loyalty of today's travelers. Even grassroots initiatives, such as ensuring that customer data platforms

are prepared for returning visitors, can create a loyal customer base, simply by letting them know what's on offer. (Höpken, W., Eberle, T., Fuchs, M., & Lexhagen, M., 2021).

Reward loyalty is a key element of the airline industry - the frequent mentality of the air mile collector still exists. Airlines use co-branding credit cards as a way to keep their travel and out-of-travel expenses in their sphere of influence, while online travel agencies use variations of "book ten nights and get one for free" for their programs reward (Leong, L. Y., Hew, T. S., Lee, V. H., & Ooi, K. B., 2015).

4.8. Information technology used to customize end-to-end travel for the consumer

Giving travelers what they want is an effective way to encourage loyalty through repeated bookings. Customization only works if data can be captured, analyzed, and operated in a way that allows the right product to be displayed to the right customer at the same time. It should be noted here that loyalty is delicate, but retaining customers is better than trying to win new ones. (Zhou, F., Wu, H., Trajcevski, G., Khokhar, A., & Zhang, K., 2020).

4.9. Innovative payment methods and alternative methods of payment in tourism - choices of a successful management in tourism.

Travel is a big ticket purchase process, and consumers expect the payment process to be perfect, fast and secure. With a selection of credit and / or debit cards in the physical wallet and applications such as PayPal that make up the digital wallet, travelers expect to be able to choose how to pay for flights and hotels.

Expenses at the destination are a different matter - entry to museums, taxi or subway fares - tend to be smaller, spontaneous purchases. But again, consumer preferences dictate how tourism companies operate at the destination, especially when these destinations attract an international audience. One reason behind Uber's global expansion is that the app serves as a de facto digital wallet for transportation when users are away from home. Comfort comes first.

Most international hotel chains have realized that Chinese shoppers will want to use Alipay. However, there are more than 300 different ways to pay travelers. The fintech sector - financial technology - helps providers by providing payment gateways and easier access to the platforms that travelers use (Almeida, F., Almeida, J., & Mota, M., 2019).

Travel agents - whether retail, business or online - have a role to play in helping travelers understand how payments work when they arrive at their destination.

It should be noted here that if the guest cannot pay for the product and service offered when the offer is made, there is no point in offering it.

4.10. Efficient and personal communication with tourists - a new type of tourism management

By using Natural Language Processing (NLP) technology in the tourism industry in combination with dialogue systems, ChatBot systems - also called Conversational Interfaces - have been developed for recording a message of complaints from tourism companies or tourists or for signaling and registration of Servicedesk requests (Li, Y., 2021). In order for these solutions not only to be a query, but also to achieve the highest possible utility in the tourism sector, other AI-based microservices have been used, such as image analysis, emotion analysis, language identification. By interconnecting to the systems for oral communication in tourism, the scope can be increased and additional users can be integrated. The use takes into account the transfer of requests to existing specialized applications, as well as aspects related to scalability and security. In conclusion, an important step in the direction of 360° communication with customers in the tourism industry becomes possible.

4.11. Using AI and ML (Machine Learning) for communicating with tourists - a new type of efficient management

Airlines, hotels and travel agencies must be available 24/7 on any channel the customer wants to use at that time. WhatsApp, Facebook and WeChat messaging applications, among others, have appeared almost out of nowhere and now have billions of users around the globe, according to technology company Amadeus. (Yu, H., 2021).

Like many new technologies, messaging applications have started as a way for people to interact. But now these applications provide a way for tourism companies to converse directly with consumers. Facebook told their investors that they have more than 10 billion messages sent between people and companies every month.

Increasingly, the interactions between consumers and companies are automated, powered by a chatbot. Chatbots in the airline industry began as automated FAQ pages, a tool that could further increase the efficiency of customer service teams by preparing a chatbot to identify and answer the most obvious questions (Chuah, S. H. W., & Yu, J. , 2021).

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The landscape of chatbots is changing, and chatbots are able to "learn" much more (See Figure 14). Connecting chatbot technology to internal data sources and layering in some machine learning systems allows robots to improve over time, learning more about how to best answer the questions they receive.
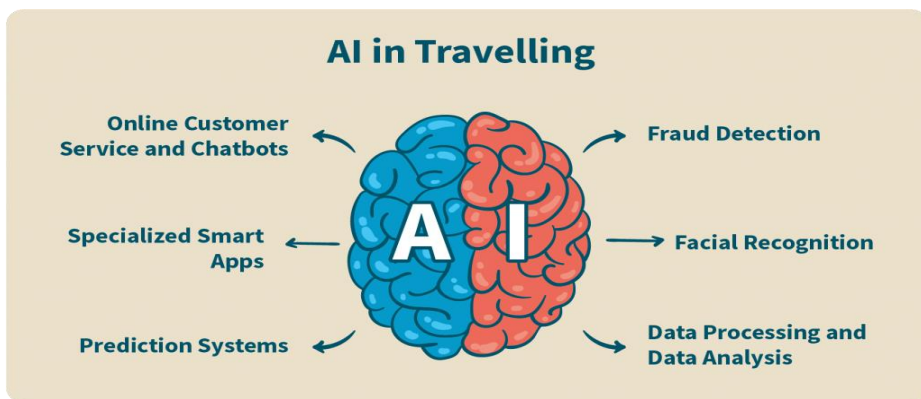

AI in Travelling

Online Customer Service and Chatbots

Specialized Smart Apps

Prediction Systems

Fraud Detection

Facial Recognition

Data Processing and Data Analysis

Figure 14 - Use of AI in tourism industry
Source: Anastasia Borodinests, AI for Tourists: Going on Vacation with a Robot Hand in Hand, https://www.qulix.com/about/ai-for-tourists-part-1

As a result, a chatbot that can answer frequently asked questions in the FAQ lists is now elementary. Many travel companies now use bots for the sale of high-end products and cross-selling. It is also worth noting that, more recently, ChatBots are learning how to help customers book and manage travel. "(Melián-González, S., Gutiérrez-Taño, D., & Bulchand-Gidumal, J. , 2021).

4.12. Voice technology in tourism. Voice assistants for transforming travel in the future

Accuracy rates for speech recognition and natural language processing have been over 95% for several years. Today, products such as Google Home, Amazon Alexa, and Apple's HomeHub, as well as those offered specifically for the Chinese market, have made conversation with a computer a way of life for tens of millions of people.

When these people travel, they expect a similar environment. Amazon has developed Alexa for Hospitality, aimed at large hotel and vacation rental chains. It

"simplifies tasks for guests, such as playing music, ordering towels, controlling the temperature or lighting in the room, finding local restaurants and attractions, calling and even check-out." (Bittendorfer, T., Bunt, J., Grunder, L., Riedel, D., Magnus, B., & Salzlecher, T., 2019).

Open systems, APIs and partnerships are the big technological trends that allow voice recognition to become operational in hotels, improving the customer experience and at the same time opening up the chance for top-level product sales, cross-selling and merchandising. Amadeus has an interest here, working with companies such as Volara, which has developed proprietary software that integrates with natural language processing platforms to create a special tool for the hospitality industry (Chen, Y., & Meng, X. , 2013, November).

It should be noted here that as digital voice-based interactions become commonplace in homes, travelers will expect similar services from their travel providers.

Voice searches instead of the classic ones, by typing have started to be very popular in the tourism industry. Clients are beginning to have voice interactions with personalized virtual assistants, and almost all devices and lights in a room can be activated vocally.

Also through voice searches, the tourist can request services, can communicate directly with the hotel staff and can call wherever he wants, can schedule a spa session, etc. Voice searches and virtual assistants for voice search are already a trend that the tourism industry takes from more and more seriously. (Rozumowski, A., Schäfer, W., & Klaas, M. (2020).

4.13. The importance of the tourist company's presence in Social Media for maintaining and increasing sales.

Social media greatly influences the decision to book the trip. Travel photography has an existence almost as long as the photo itself. Today, smartphone cameras allow anyone to take and post photos while on a trip. It frames, clicks, loads, and then shares. Specific photo sharing platforms such as Instagram and Pinterest host billions of images. "#Travel" has been used almost half a billion times on Instagram alone (Egarter Vigl, L., Marsoner, T., Giombini, V., Pecher, C., Simion, H., Stemle, E., ... & Depellegrin, D., 2021).

As in the case of chatboats, travel companies must use these platforms, because that is where their customers are. Instagram has about 500 million daily active users, 80% of whom follow the activity of at least one company (Sun, B., 2021).

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Images have always inspired travel, and many companies now connect their booking engine to an image or use the super-sophisticated addressing of platforms provided to reach specific audiences viewing specific images. These advertising products will become more sophisticated over time as platform owners try to monetize users. It should be noted here that photo platforms are not only inspiration, but can generate conversion to tourism, producing the desire to travel, to see, to feel, etc. (Jansson, A. , 2018).

4.14. Sustainability and responsible travel for a strategic and efficient management

Tourism and aviation face a major PR crisis for consumers in the coming years - the struggle with the perception that the tourism industry is the negative player in the climate crisis scenario. No one in the tourism industry is ignorant of their responsibilities to the planet, but travelers not only question the response of travel agencies in times of crisis, but also take into account the sustainability factor when choosing how and with whom they will travel. (Van Rheenen, D., 2017).

Sustainable Travel Report 2020 revealed that 55% of its global sample of respondents has become much more concerned in the last twelve months about the impact of their journey on the environment. The Swiss bank UBS found that one in five Western passengers agreed to fly less because of environmental issues, in particular, but not exclusively, based on the idea of "shame to fly". And, as in the booking.com poll, UBS noted that travelers' interest in such issues has intensified in recent months (Rahmadian, E., Feitosa, D., & Zwitter, A., 2021).

The tourism industry needs to pay attention to this, because travelers are following its reaction. Excessive tourism activities are a central element in the conversation about sustainability. The tourism industry plays a role in supporting the attempts of popular destinations to limit the number of visitors, while ensuring that those travelers have other alternatives in their vicinity. (Van Rheenen, D., 2017).

It should be noted here that many customers believe that traveling is harmful to the planet. However, the tourism industry must provide factual information about the impact of travel and find ways to travel without pollution.

Conclusion

The great struggle in the tourism industry right now it is about the travel agent of the future and the implementation of specialized technology. Following the

development of Artificial Intelligence software, it seems that the position of travel agent will disappear in the future, being replaced by the tourism consultant. After eighteen years of success, OTAs are thriving, as are most offline agencies. Offline agencies have survived the evolution because they have adapted their business models and instead of avoiding information technology, they have embraced the idea of evolution.

What the experts did not take into account, when they claimed that the function of travel agent will also disappear, is that OTA has no human touch. In a digital age, customers now have more desire than ever to be able to get advice. Successful travel agents have therefore focused their efforts on customer experience and building long-term relationships with them, using technology. The 21st century travel agent is - and will continue to be - a concierge, consultant and confidant, using a variety of tools, from social media to online messaging services, to communicate with customers. As a result, consultants are becoming more and more integrated into the daily lives of their clients, providing information about travel, this being the modern version of the human touch that clients want.

Successful consultants also realize the need for customization, integrating technology to help them do so. Thus, without tools such as a sophisticated CRM that ensures that sales and marketing tactics are personal and properly targeted, success is far from being achieved.

For success, travel agency managers need to implement specialized technology to help agencies focus on what they do best! To sell an experience, not a tourist package!

Benefits and challenges of operationalizing AI in the field of tourism are now very clear and concise. There are many success stories that demonstrate the value of AI in tourism. Tourism organizations that add Machine Learning and cognitive interactions to traditional tourism business processes can significantly improve their user experience.

However, there are some obstacles. Few tourism companies have implemented AI on a large scale, for several reasons. For example, if they do not use cloud computing, AI projects are often expensive in terms of computing power. They are also difficult to build and require much sought-after expertise, but little is available. If tourism companies know when and where to incorporate AI, as well as when to turn to a third party, then they will be able to reduce their difficulties.

The emergence of AI-based solutions and tools in the tourism field means that more travel companies can take advantage of AI at a lower cost and in less time. AI

ready for use in tourism refers to solutions, tools and software that have either built-in AI functionality or automate the algorithmic decision-making process in tourism. AI ready for use in tourism can be anything from standalone databases, which are automatically repaired with machine learning, to predefined models that can be applied to a variety of data sets, to solve challenges such as image recognition and text analysis. This can help tourism companies achieve faster time to value, reduce costs and improve customer relationships.

But, unfortunately, nowadays we can see some barriers to achieving the full potential of AI in the tourism industry. Despite the promise of AI, many travel companies do not realize the full potential of Machine Learning and other AI functions. Ironically, it seems that the problem lies largely in people. Inefficient workflows can slow down tourism companies in obtaining the full value of AI implementations.

For example, data experts may have difficulty obtaining the resources and data they need to build machine learning models. He may have trouble collaborating with teammates. And they have many different open source tools for management, while application developers sometimes have to completely re-encode models that data experts develop before they can incorporate them into their applications

With a growing list of open source AI tools, the IT sector ends up spending more time supporting data science teams, continuously updating their work environments. This problem is exacerbated by limited standardization in the way data science teams want to work.

Finally, the executives of a tourism company may not have an overview of the full potential of their company's AI investments. As a result, they often do not provide sufficient guarantees and resources to create an interactive and integrated ecosystem, which is necessary for AI to be successful.

But, we say, in order to remain competitive, every tourism organization must embrace AI and build an AI ecosystem. Regarding this aspect of the introduction of AI and robots in the tourism industry, 61% of Europeans have a favorable opinion about the introduction of AI and robots in everyday life, but 88% of them say that these technologies require more careful strategic management. , especially in the tourist area (Eurobarometer 2017, EU 28)

Tourism companies that fail to adopt AI under certain conditions in the next 10 years will lag behind. Although some tourism companies may consider them to be the exception, most travel companies do not have the in-house talent and expertise to develop the type of ecosystem and solutions that can maximize AI capabilities.

In order to develop the right management strategy and access the right AI tools, tourism companies must look for an innovative partner with deep expertise in the field and a comprehensive AI portfolio.

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