

Tourism 4.0 -The Digital Innovations in Hospitality and Tourism Industry

السياحة 4.0 - الابتكارات الرقمية في صناعة الضيافة والسياحة

Jitendra Singh¹, Rajeev Mathur², Masood Aslam³, Naveen ⁴

^{1,4} Assistant Professor, School of Hotel Management Catering & Tourism, IIMT University Meerut, India

² Assistant Professor, NIMS International School of Hotel Management, NIMS University Jaipur, India

³ Dean, School of Hotel Management Catering & Tourism, IIMT University Meerut, India

¹ jitenchaudharytourism@gmail.com

Accepted

قبول البحث

2023/12/23

Revised

مراجعة البحث

2023/10/3

Received

استلام البحث

2023/7/1

DOI: <https://doi.org/10.31559/CSSS2024.2.1.6>



This file is licensed under a [Creative Commons Attribution 4.0 International](https://creativecommons.org/licenses/by/4.0/)

Tourism 4.0 -The Digital Innovations in Hospitality and Tourism Industry

السياحة 4.0 - الابتكارات الرقمية في صناعة الضيافة والسياحة

Abstract:

Objectives: The one of four equal parts of the industrial stage has affected all domains, savings, and activities. Technology, the key planner for Industry 4.0, likewise has a vast effect on the tourism industry. The objective concerning this division search is to consider by what method the idea of Industry 4.0 has happened, allowing for the possibility of tourism. Notwithstanding that philosopher gave consideration to the concept of Industry 4.0 earlier in their careers, the research on Tourism 4.0 is still in first early stages.

Methods: Tourism 4.0 research is still in its formative phase. Therefore, an exploratory type of research was chosen to achieve the research objectives and a descriptive way of presenting the results. Data collection was done using a systematic internet survey. This method was completed from January to July 2020–21. Mega search engine The National University Library (NUK, ND) was used for the search with academic articles published in important scientific databases; it is the most complete collection of scientific articles. Google Scholar and the Google search engine were used in this search additional related documents.

Results and Conclusions: The research results are divided into three subsections. The first and second parts provide answers to the first and second studies. The third part deals with the third research question. The first part introduces the various uses of the term tourism 4.0. For any country that has already implemented the term Tourism 4.0. Part second shows how to deal with the term tourism 4.0. In an academic article, the third section condemns and compiles. Examples of the implementation of enabling technologies leading in Industry 4.0 in the field of tourism services.

Keywords: Tourism 4.0; big data; virtual reality; artificial intelligence.

الملخص:

الأهداف: يهدف هذا البحث إلى دراسة كيفية تطبيق مفهوم الصناعة 4.0 في قطاع السياحة وعلى الرغم من أن الفلاسفة أول من أولوا اهتمامًا بمفهوم الصناعة 4.0 قبل بضع سنوات، إلا أن البحث المتعلم في مجال السياحة 4.0 لا يزال في مرحلة مبكرة.

المنهجية: يتعلق هذا البحث بنوع وصفي، يستخدم بالاشتراك مع النتائج التي تقدم شرحًا. تم الحصول على البيانات من مصادر ثانوية وتم التخطيط باستخدام استراتيجية دراسة المحتوى.

النتائج والخلاصة: تستخدم الحكومات مصطلح السياحة 4.0 بطرق مختلفة جدًا. ثم قام المستشارون السياحيون والمترجمون والأكاديميون بتطبيق الثورة التكنولوجية للجزء الإلكتروني من واحدة من أربعة أجزاء متساوية لجذب المساعدات في السفر.

الكلمات المفتاحية: السياحة 4.0؛ البيانات الضخمة؛ الواقع الافتراضي؛ الذكاء الاصطناعي.

1 Introduction

The first industrial revolutions, which began around 1750, were greatly influenced by the quickening pace of scientific and technological progress. However, in terms of technical advancement and socio-economic and cultural influence, the fourth industrial revolution (Industry 4.0) and its implant technology dissemination development are expected to grow dramatically. As a result, dealing with such transformations calls for an all-encompassing strategy that covers innovative and sustainable system elucidation as well as technological ones. In this research paper we present a framework that can make it easier for technology and social innovation to interact in order to continually develop motivated, suitable, and sustainable methods. These plans have the potential to boost the economy, strengthen society as a whole, and safeguard the environment.

The development of the so-called fourth industrial revolution and the concept of Industry 4.0 have been facilitated by changes in display, growth, and rising competition (Piccarozzi and others, 2018). As we mark the beginning of a new millennium, electronics have become more intelligent, unified, and pervasive in their frugality. Along with the Internet, history has advanced at a fundamental level in both the financial and public spheres (Diez-Olivian and others, 2019).

1.1 The Term Industry 4.0

In order to counter the growing competition from abroad and set the German and European Union industries apart from other global marketplaces, the phrase "Industry 4.0" was developed in 2011 at the Hanover exhibition in Germany (Pascall, 2017). It was first associated with "factories of the future" or "smart factories." The "smartification" of manufacturing industries, according to Diez-Olivian et al. (2019: 92), "has come up with the fourth industrial revolution, or Industry 4.0, a radical shift set in motion by the improvement and continuous sophistication of new information and communication technologies (ICT) applied to industrial processes and products. Even so, the criteria of Industry 4.0 have become global (Rodič, 2017).

In order to counter the growing competition from abroad and set the German and European Union industries apart from other global marketplaces, the phrase "Industry 4.0" was developed in 2011 at the Hanover exhibition in Germany (Pascall, 2017). It was first associated with "factories of the future" or "smart factories." The "smartification" of manufacturing industries, according to Diez-Olivian et al. (2019: 92), "has been come up with the fourth industrial revolution or Industry 4.0, a radical shift, set in motion by the improvement and continuous sophistication of new Information and Communication Technologies (ICT) applied to industrial processes and products. Even so, the criterion of Industry 4.0 has become global (Rodič, 2017).

Industry 4.0, or the internet of things, is discussed by Acatech (2014) as the inputs and services that will alter future manufacturing, logistics, and work processes. This indicates that with the adoption of new technologies like machine learning, embedded systems, and wireless connections, the IoT has advanced beyond its internet-connected relevance in recent years.

Evidently, the European research cluster on the internet of things (IERC) enunciates that the IoT is "a unified future internet that is a fundamental global network framework that may be described as having self-configuring proficiencies based on excellence and consonant communication discipline where physical and virtual 'things' have specified physical attributes, virtual personalities, use intelligent interfaces, and are logically integrated into the information network."

Industry 4.0, according to the European Parliament (2016:20), "replaces the organization of result processes established electronics and plays that alone write accompanying each one next to the advantage chain in essentially calculating models."

According to Schwab (2016), Industry 4.0 is a selection of new electronics that mix the material, mathematical, and organic worlds. It is established worldwide styles of the following concerning details:

Physical: self-forceful instruments, realistic model dossiers, state-of-the-art study of computer s, new matters.

Digital: WWW of belongings delivered daybook electronics/block chains, electronics-located manifestos.

Biological plant structure.

1.2 Why Industry 4.0 is important?

Schmitt (2015) confirmed five reasons why Industry 4.0 is foremost and is seen to be revolutionary in the era of information technology and open market operations.

First Reason: Today's challenges are compounded by increasing market volatility, shorter product lifecycles, product complexity, and complex global supply chains. Industry 4.0 relieves pain for manufacturers and helps enable businesses to become more agile and responsive to business trends. For example, smart tools will lead to greater unification between the top floor and the workshop. This will lead to increased intelligence and flexibility in the production process.

Second Reason: Industry 4.0 can in fact change modern economies towards becoming more innovative and, hence, increase productivity. It is conceived that the use of smart technologies such as digital chains, smart approaches, and industrial internet will generate innovation, considering new business process models would be able to be deployed quicker.

Third Reason: understands the consumer as a collaborator and places the consumer at the core of central activities. The product customization process is the most important part of the product value chain, and digitization will allow for crowdsourcing, which will speed up the design process.

Fourth Reason: Industry 4.0 has put people at the center of production. Workers will be assigned when they need help, so the demand for workers with general project management skills will be higher, but there will also be more flexible jobs.

Fifth Reason: At the end of the day, we say it will bring sustainable prosperity by harnessing the power of new technologies to solve problems in energy, resource, environment, economics, and social. Innovative solutions can: Reduce energy consumption help businesses reinvent themselves with existing and emerging business models. Utilize emerging technologies to produce anywhere (even in luxuries) close to the market utilize the skills of the nation's workforce.

1.3 A Framework for a Sustainable Industry 4.0

The impact of technology is not limited to an industrial and economic perspective and could play a crucial role in accelerating a paradigm shift (Rifkin, 2014). However, there are several unexpected consequences of the fast pace of technological innovation. The challenges posed by technological innovation must be addressed from an interdisciplinary and innovative perspective, offering innovative solutions that incorporate progressive techniques that can be implemented to forecast future emerging technologies and their impacts from a holistic perspective.

A win using the whole of sustainability, with a focus on meeting the needs of today's generation without sacrificing tomorrow's ability, is a good starting point. But the foundation of our straightforward framework is made up of three essential components: economic, social, and environmental (Adam, 2006). In order to provide sustainable solutions that satisfy the three main sustainability criteria and to serve as an evaluation tool for any associated advances in Industry 4.0, technological and social innovation play a crucial role. as shown in Figure 1.

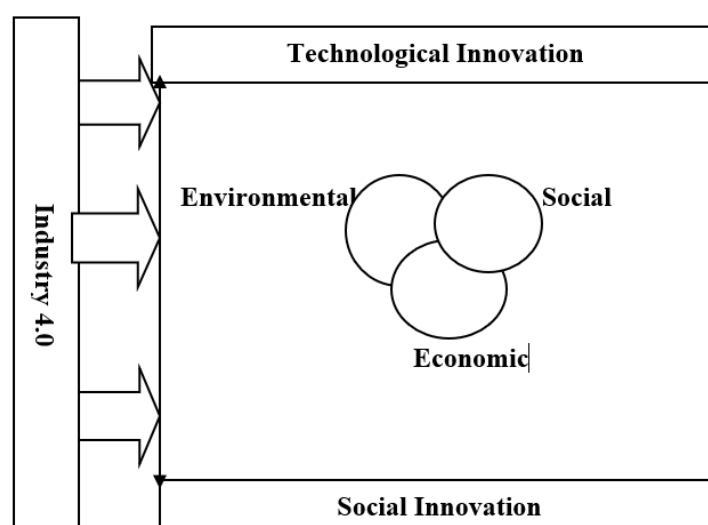


Figure 1: A framework to preventive the potential of a sustainable Industry 4.0 (2017)

(Source: Own Elaboration)

2 Literature Review

2.1 History and aims of Tourism 4.0

Tourism and technological upgrading have been associated for a long time (Poon, 1993; Buhalis & Law, 2008). Among the major landmarks in this process, one could note the establishment of the computer reservation systems (CRSs) in the 1970s, the global distribution systems (GDSs) in the 1980s, and the spread of the internet in the 1990s. Because tourism is a part of the global economy today, tourist destinations have to be, now more than ever, innovative as regards the use of new business models and state-of-the-art technology. To achieve this, first and foremost, adequate information on the state-of-the-art and future trends is necessary.

Tourism 4.0 is a global initiative. It represents a shift in thinking as it puts the local community at the center of the tourism ecosystem, which also consists of tourists, tourist service providers, and the government.

Its aim is to unlock the advent-grade potential in the whole tourism sector and to create enriched tourist experiences with the help of new technologies. The mixture of the indicated chauffeurs has existed, disorganizing whole activities, their connected allocation, and devouring; it capacitates to produce a state-of-the-art trade blueprint and a whole personalized of commodities and duties (Schwab, 2016). Customization of duties is exceptionally important in travel. Over the past six decades, tourism has persisted, improving and enhancing individual of the best and fastest-increasing enterprises in the planet; worldwide traveller arrivals are expected to reach 1.8 billion by 2030 (UNWTO, 2018).

Diversified trades engaged in travel (like tour planners, travel powers and intermediaries, transfer guests, lodgings, bars, etc.) are presented with huge hope for growth. However, their future will be intensely jolted by friendly, financial, and governmental policies, referring to practices or policies that do not negatively affect the environment and concerning details, changes, and challenges. Technology development is certainly one of four bigger, all-encompassing styles that are inclined to have unusual impacts and relevance in tourist growth (OECD, 2018).

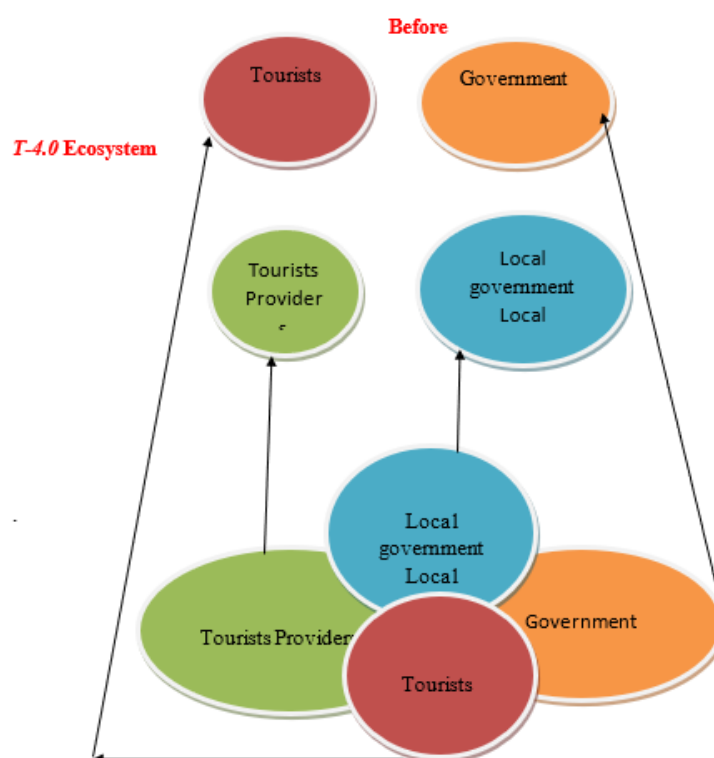


Figure 2: Tourism 4.0 interconnected elements in tourism
(Source: Own Elaboration)

The positioning of fact-finding automation in Industry 4.0 is known for its disorderly effect that impacts many sectors, including tourism (Manjari, 2018). Technological escalation in tourism has earlier been, in some cases, described by a contemporary term, Tourism 4.0, which is based on a new pattern in industry, Industry 4.0. Due

to the sizeable growth of the tourism sector and its contribution to the economy, it is important to research how the term tourism 4.0 has been used and understood up to the present and how the 4th industrial revolution and its key enabling technologies have been embraced by this important service sector.

Few philosophers on Tourism 4.0 have been involved in the debate over the open interest in specific changes in travel and the active partnership of demand and supply in stock exchange. The following research questions will serve as the foundation for this division's goal to contribute to the academic interest in tourism 4.0.:

- When was the term "Tourism 4.0" put into action?
- How was the concept of Tourism 4.0 utilized and embraced in the past?
- What somewhat key science enablers for Industry 4.0 have happened generally second-hand in tourism?

2.2 When did the term Tourism 4.0 appear?

The first country that second-hand the term Tourism 4.0 previously in time or order was Portugal. No matter by what method, the term Tourism 4.0 second-hand in 2016 had content similarly accompanying key science facilitators for Industry 4.0. Literally, it was connected to accompanying the leadership of advancing the trade, accompanying support of travel and travel start-booster, and accompanying advances in tourism (Turismo de Portugal, 2017). Portugal awarded the same-established conduct in the role of Tourism 4.0 (Ferreira Nunes, 2016). During that year, the program was declared one of the four archives of UNWTO for receiving the award for Excellence and Innovation in Research and Technology in Tourism (UNWTO Awards, 2016). The term Tourism 4.0 was once again used in 2018 in the wine tourism project 'Wine Tourism 4.0' -to enhance ecotourism tourism in the Alentejo region (Wines, 2018).

With thanks to the UNWTO, the phrase "Tourism 4.0" was first used at the special session on smart Tourism at the 22nd UNWTO General Assembly in September 2017. In light of the rapid changes in the tourism industry and the treatment of the touristy progressive environment, the word was still in common usage (Conference Note, 2017).

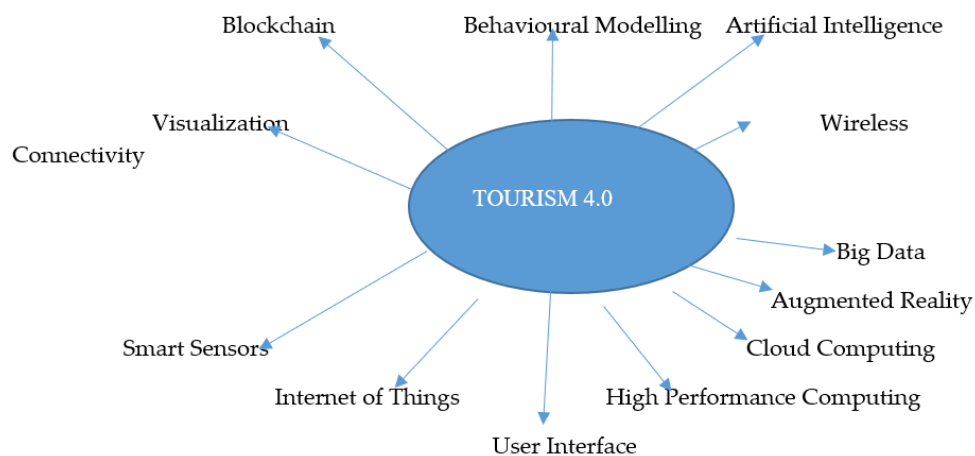


Figure 3: A key enabling technology-ICT

(Source: ERUDIO Education Canter innovative issues and approaches in social sciences, 2019, vol. 12, no. 3) ISSN 1855-0541.

2.3 How has the phrase "tourism 4.0" been used and interpreted up to this point?

The distinction between the necessary electronics directors of Industry 4.0 in travel is concluded by various pronouncements. Examples include:

- The most completely second-hand' (for instance, the internet)
- A necessary feature' (for example, a great dossier)
- The individual that 'plays central; functions in tourism' (for instance, computer simulation)
- The formerly created network dichotomized 'tween clients and merchants (for example, electronics-located trade models).
- The individual that 'drives change and is helpful' (movable electronics)

- The most standard circle' (such as androids and AI)
- The most seeable circle' (for instance, chatbots, etc.).

Manjari (2018) observed Tourism 4.0 as the next move in tourism innovation, set side by side with e-tourism and m-tourism, where:

a. E-tourism refers to the digitalization of travel that starts and surrounds monetary friendship, utilizing the internet to offer travel-accompanying duties like lodging restriction, departure, or motor help.

b. M-tourism is perceived to show congregate touristy accompanying interplays sustained through travel devices (like global positioning systems, photoelectric maps, facts about points of interest, shops, bars, etc.).

Starć Peceny and others. (2019) notice to Tourism 4.0 concerning a new beautifying design. Tourism 4.0 bears "opening the change anticipated in all travel subdivisions" by way of key allow electronics of Industry 4.0 (such as computer networks of belongings, grown dossiers, block chains, artificial intelligence, in essence, and improved realism).

2.4 Examples of key technology enablers for Industry 4.0 in subsectors of tourism

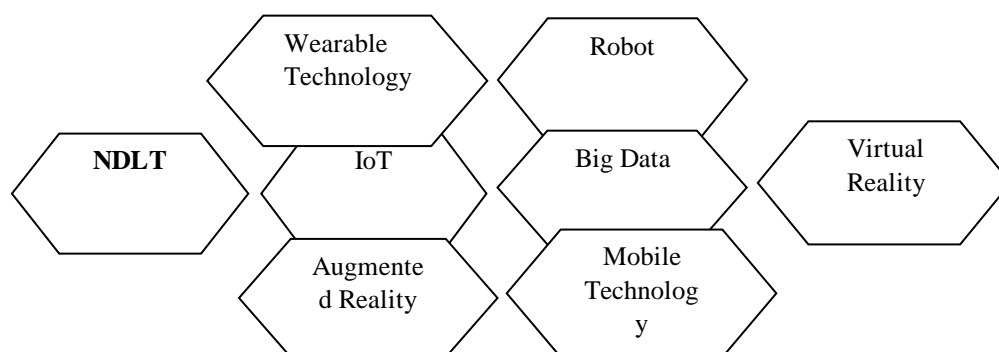


Figure 4: Key technologies enablers for tourism 4.0

• NDLT (New digital ledger technologies)

Specialists say that technology can advance and guard the travel industry. According to the 2020 SITA Air Transport Insights Report, 98% of airlines are planning to put money into applications for passenger mobile services, and 87% will invest in in-house virtual and remote IT services. Technologies like the Internet of Things (IoT) are an emerging trend in the tourism domain and can potentially disrupt the entire industry. The focus on customization, securitization, and optimization will allow airlines, hotels, and cruises to make a critical shift in the traveling industry.

a. Internet of Things (IoT) and Travel Industry

In 1999, Kevin Ashton initially used the term "Internet of Things." IoT is a network of linked physical items and gadgets that communicate and share data across wireless networks. The two basic parts of the Internet of Things are the "Internet," which is the primary component of connectivity, and "things," which refer to objects and physical equipment. It brings the internet's capabilities for data processing, analytics, and decision-making to the physical realm of real-world items.

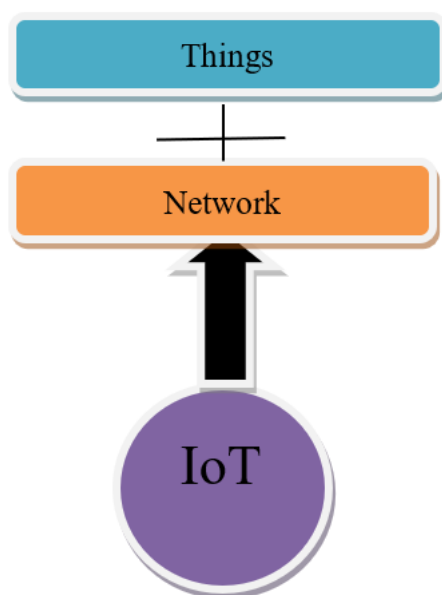


Figure 5: Flow Chart /Process of Internet of Things
(Source: Self Elaborated, 2023)

- **Internet of Things (IoT): personalization**

The Internet of Things (IoT) is a large amount of data collected from tourism organizations that, one by one, authorizes them to create highly personalized services. According to the Q1 2021 GlobalData Consumer Survey, 83% of consumers fall into one of two categories: 'in some way', 'all the time', or 'decided by a service tailored to their needs or personality'.

The IoT in the tourism industry can create personalized experiences in two ways: by allowing travelers to manage multiple devices or services via a single centralized device (e.g., a tablet or mobile app); or by companies storing data from the IoT to enable devices to create personalized marketing campaigns or to remember their preferences for future visits.

For instance, a guest might visit the same hotel every winter. A hotel company using an innovative thermostat might set the thermostat to the guest's comfort level when they come back, which is the same as last year. These small, personalized services could make all the difference for many customers. This is especially true in the luxury segment, where attention to detail is higher than in the mid- and low-end segments.

- **Internet of Things (IoT): enhancement of touristic experiences**

IoT technology can be used by tourism business organizations and destinations to send specific location data to customers. This can enhance the vacationer's experience 'in the middle' of their trip. By combining the potential of smart phones with the power of beacons or other sensors, we can send messages to vacationers at the point where they are most needed, based on their location. This would be especially effective on walking tours throughout the city. For example, when tourists are passing by an ancient ruin, we can send them a message that describes what they're seeing and what that means in relation to the history or culture of the destination.

b. Big data

Big data is a main feature of Tourism 4.0 (Manjari, 2018). The killing of substantial dossiers in a touristy way bearing original-period news about visitors, their flows, their precession, their purchasing conclusions, their desires, etc. Big dossier is assembling from various beginnings, place visitors surpass their mathematical similarity: on friendly publishing, on visitor gates, accompanying androids and chat bots, etc. (Dolgos, 2018). The benefit of information retrieval by huge dossier requests is that those dossiers are established by real-site measures and collected by surveys. Thus, they are honest, explanatory, and far-reaching and contain disposal volume; they also permit the killing of the handy calling models to improve the influence of departments dealing with customers (Kraus, 2017). Big data has once governed all shopping approvals and regions, aiming to 'stay in front of what clients need' (McCraken, 2018).

c. Virtual reality (VR)

Virtual reality (VR) is playing a big role in tourism. Tourists prefer virtual trips to exciting and fictional locations using VR touch and his 360-degree vacation videos (Fez, 2018). A sizable virtual reality theme park debuted in Guizang, China, in April 2018 (Ashcraft, 2018). A few airlines have already made the move to VR.

A test program from Qantas showcasing virtual vacation spots for affluent travelers, including Kakadu National Park, the Great Barrier Reef, and Hamilton Island, was introduced in 2015. (Manjari, 2019), while KLM Royal Dutch Airlines launched travel from New York to Europe. We supplied VR headsets for travelers flying from New York to Europe (Drescher, 2018).

d. Augmented reality (AR) technology

Travel planning is becoming more thorough, collaborative, and simple thanks to augmented reality (AR) technology (Augment, 2016). When viewed through specific gadgets, AR alters how people perceive the outside world. The technology shares similarities with VR, but AR enhances the real environment by overlaying digital components instead of replicating them (Revfine, no date). AR technology allows you to overlay your digital augmentation onto an existing reality or frame. From a tourism perspective, this means booking hotels, getting local information, navigating to destinations, interpreting written and spoken signs and conversations, and finding alternative dining and entertainment options, all on mobile devices. (Augment, 2016).

e. Mobile Technology

Mobile technology is driving change and development in the travel industry (Meza, 2017). Future hotels may use digital technologies to transform guest rooms into 'places of happiness'. Hotels are already able to perform various actions simply by using mobile applications on smartphones, such as check-in, check-out, and temperature control (Fes, 2018). For young travelers, smartphones become room keys, menus, and bills (Majendie, 2018). Everything at the KViHotel Budapest is managed by the visitor's smartphone.

Using the app, visitors may check in from any location. The entire contents of your accommodation are controlled by your smartphone, which can also offer concierge services (KViHOTEL, n.d.). In addition, a hotel in the heart of Slovenia's capital city, Ljubljana, offers mobile check-in, check-out, and payment options. Room keys are delivered to visitors via smartphone (Pusnik, 2018). Additionally, there is a close relationship between airlines, travelers at airports, and smartphone users (such as check-ins) (Grad, 2014). Travelers may soon be able to carry digital ID cards with them thanks to mobile interfaces and gadgets (World Economic Forum, 2018).

f. Wearable technology

Wearable devices like smartwatches, wristbands, and eyewear are gradually becoming commonplace in the travel industry. American Airlines makes it easier for Apple Watch users to receive boarding pass, gate change, and baggage claim notifications. Uber allows users to request rides and receive arrival notifications on their watch. Hotels can work with Apple Watch to allow guests to check-in and view reservation details. Instantly book and open doors using your portable device. The future of travel with smartwatches is even bigger. However, travel management companies are still technologically far behind this trend (Dorsi, 2016).

g. New Digital Ledger Technology

New digital ledger technologies should enable trust and reliability (Hausold, 2017). Therefore, various ideas existed on how to use digital ledger technology to enable fast money transfers, how to pay with cryptocurrencies, how to reward loyalty with cryptocurrencies, etc. (e.g. Pino, 2018; Starc Peceny et al., 2019). In the near future, it is predicted that digital protocols (such as blockchain) will allow passengers move to the airport and leave attendant parking and identification at home (Hausold, 2017).

h. Robot

Robots for hotels and restaurants are arguably the most well-liked new technical development. They were created using a robotics and artificial intelligence (AI) combo. There are numerous instances of AI robots being deployed in the travel and hospitality industries:

1. **Mario**, an artificial robot, welcomes visitors to the Marriott Hotel in Ghent, Belgium. Mario speaks to visitors about events, bus schedules, breakfast buffets, and more in 19 different languages (Hyland, 2017).
2. **The artificial robot Connie** works in the same capacity as Marriott's Mario at the Hilton Hotel in McLean, USA (Slejos, 2016).

3. Aura, Botlr, or Relay robots are assisting bring towels, toothpaste, and drinks to hotel rooms in a number of US hotels (Wood, 2017). The robot, which resembles a rolling box, can only interact with visitors through a screen. To get around the hotel, they use its WiFi, sensors, and 3D cameras (Martin, 2016).

4. At the Yotel hotel in New York, a futuristic storage robot in the lobby collects guests' luggage and places it in lockers (Martin, 2016).

5. In Turkey, attempts are being made to use the humanoid robot "Robin" for guidance and advertisements at airports. The robot can be programmed to work in hotels as well (Freifer, 2017).

6. The first hotel in the world without human personnel is the Henna-na hotel, which translates to "strange hotel" and is located in southwest Japan. For guests who speak Japanese and English, a humanoid robot will help with check-in and a dinosaur robot will help with check-out. Visitors must first submit their information on the touch panel screen by pressing a button on the desk. The visitor's luggage is delivered to their room by another robot. Standard electronic keys are replaced by facial recognition technology to unlock hotel rooms (The Guardian, 2015). Japan's first robot-staffed hotel achieved such success in just two years that hotel owners explored creating a network of 100 of his robot-staffed hotels around the nation. 2017 (Freifer).

7. In order to accept orders and handle payments at its fast food locations, Pizza Hut has announced that it will employ the robot Pepper as a waiter. Pepper is a robot with artificial intelligence that can recognize and react to human body language, expressions on the face, and intonation. Customers can converse with one another in this way "just like friends and family" (Curtis, 2016).

8. Robot bartenders are employed by Royal Caribbean (Venegas and Belarmio, 2018).

9. Tavelmate is a robot suitcase that helps travelers carry their stuff with ease. A standalone luggage would be sensible to follow its owner by themselves. In addition to having a 360-degree power off feature, it has anti-shock technology. There's no need to push, drag, or carry the case anymore.

Travelers anticipate that by 2020, robots will play a significant role in their life, according to Travelzoo's (2016) global poll on the usage of robotics in travel. rice paddock. He said that out of 6,000 respondents, 75% were pleased with the use of robots in the travel industry. International travelers are generally in favor of utilizing robots while on vacation, although some nations seem to be less so. Chinese and Brazilians were the most supportive of robotics and AI, while Germans and the French were the least supportive. Overall cost-effectiveness and data maintenance and retrieval are the main advantages respondents see in robots. More than three-quarters of respondents believe robots are better at processing data (81%) and can speak different languages (79%), and 76 believe robots have better memories.

Today, chatbots are likely the most well-known application of AI in the travel and hospitality industries. It is a virtual assistant that can communicate with people in natural language using chatbots and other apps (like Alexa from Amazon). One of the first airlines to deploy chat applications and bots was the Dutch airline KLM, which used them to deliver passengers' boarding cards and flight information via Facebook Messenger, WeChat, Viber, and other chat apps (Peterson, 2018). Travel chatbots have already been incorporated by certain online travel agencies (like Expedia).

When the robot or chatbot completes a task, it gathers a variety of information on hotel visitors. As a result, they develop into "active mobile big data collectors." And it has three advantages because they are devices linked to his extensive IoT network. Initially, it serves as a data collection hub. Additionally, you can engage with your visitors. Third, it is capable of carrying out additional jobs (Hospitality Technology, 2020).

Technology-based business models that create networks that link buyers and sellers are another glaring example of technological advancement in the twenty-first century (Schwab, 2016). Some economic sectors have recently welcomed the advent of technology-based businesses (Brain, 2017). These support the "on-demand economy," also known as the "peer economy." The business model of this kind most widely recognized in the lodging industry for tourists is Airbnb (Zupan Kore, 2018).

The dominance of digital platforms is another significant technological development in the travel and tourism industries, in addition to the rise of intelligent automation (robotics, AI, and IoT). The gathering of enormous volumes of data in several systems across numerous touchpoints with customers and providers will be the next signal for technological solutions with the aid of artificial intelligence (World Economic Forum, 2018 Year).

3 Conclusions

The transfer of Industry 4.0 ideas to Tourism 4.0 is discussed in this article. We shall keep a closer eye on the effects of the Fourth Industrial Revolution on tourism (demand and supply sides) because it is a significant contributor to the global economy and has been increasing steadily over the past few decades. I must do it.

The massive internet research on secondary assets offers answers to three study questions: firstly, how did the term "tourism 4.0" seem; secondly, how has the time period been used and understood up to the present; and third, what are the most visible examples of the technology of industry 4.0 within the context of tourism? Consequently, the effects imply the parallels and variations between the ideas of enterprise 4.0 and tourism 4.0.

In less than ten nations (Portugal, Finland, Italy, Spain, Slovenia, Turkey, Thailand, Malaysia, and Bali), the phrase "tourism 4.0" first appeared in government documents, policy documents, and expert materials in 2017. The phrase has been employed as an "overarching term" for encouraging travel inside a specific nation, permitting technological advancement in travel, putting new travel "ecosystems" in place, etc. The "red thread" connecting all tourism 4.0 studies, however, is technological advancements in the tourism industry, including big data, robots, artificial intelligence, mobile technology, virtual reality, and distributed ledger technology.

References:

- Abrogio, T. (2017). *Tourismo 4.0: La Trasformazione Digitale*, 3 Aug 2017. <https://www.ultimavoce.it/turismo-4-0- trasformazione-digitale/>
- Alexis, P. (2017). R-Tourism: Introducing the potential impact of robotics and service automation in tourism. *Ovidius University Annals, Economic Sciences Series*, 17(1), 211–216.
- Almada-Lobo, F. (2016). The Industry 4.0 Revolution and the Future of Manufacturing Execution Systems (MES). *Journal of Innovation Management*, 3(4), 16–21. https://doi.org/10.24840/2183-0606_003.004_0003
- Andersson, P., & Mattsson, G. L. (2015). Service Innovations Enabled by the Internet of Things. *IMP Journal*, 9(1), 85–106. <http://doi.org/10.1108/IMP-01-2015-0002>
- Ashworth, G. J., & Tunbridge, J. E. (1990). *The tourist-historic city Belhaven*. AWS Case Study: Red Lion Hotels. <https://aws.amazon.com/solutions/case-studies/red-lion/>
- Balasubramanian, K., & Ragavan, N. A. (2019). What are the key challenges faced by the Malaysian hospitality and tourism industry in the context of industrial revolution 4.0? *Worldwide Hospitality and Tourism Themes*, 11(2), 194–203. <https://doi.org/10.1108/whatt-11-2018-0079>
- Brain, L. (2017). *Tourism technology changed the way we travel*. *Tourism Review*, <https://www.tourismreview.com/tourism-technology-is-essential-for-any-travel-companynews5505>
- Buhalis, D., & Amaranggana, A. (2015). *Smart tourism destinations: Enhancing tourism experience through personalisation of services*. In I. Tussyadiah & A. Inversini (Eds.), *Information and Communication Technologies in Tourism*, (pp. 377–389). Heidelberg: Springer.
- Buhalis, D., & Amaranggana, A. (2015). Smart Tourism Destinations Enhancing Tourism Experience Through Personalisation of Services. In *Information and communication technologies in tourism 2015* (pp. 377–389). Cham, Switzerland: Springer. http://doi.org/10.1007/978-3-319-14343-9_28
- Capturing, M. (2018). *Capturing Millennial Travelers Through OMNITX and Tourism 4.0*. <https://era.cognitix.id/cognitix/capturing-millennial-travelers>
- Chung, N., Tyan, I. & Han, H. (2017). Enhancing the smart tourism experience through geotag. *Information Systems Frontiers*, 19(4), 731–742. <https://doi.org/10.1007/s10796-016-9710-6>
- Dorsi, S. (2016). *Travel industry- wearables don't offer much*. *Tourism Review*. <https://www.tourismreview.com/hotel-of-the-future-would-include-lots-of-technologynews10616->
- European, P. (2016). *Industry 4.0. Directorate general for internal policies. Policy department A: Economic and scientific policy*. [http://www.europarl.europa.eu/RegData/etudes/STUD/2016/570007/1/POL_STU\(2016\)570007_EN.pdf](http://www.europarl.europa.eu/RegData/etudes/STUD/2016/570007/1/POL_STU(2016)570007_EN.pdf)
- Goldenberg, B. (2015). *The Definitive Guide to Social CRM: Maximizing Customer Relationships with Social Media to Gain Market Insights, Customers, and Profits*. Upper Saddle River, NJ: Pearson Education.
- Gretzel, U., Sigala, M., Xiang, Z., & Koo, C. (2015). Smart tourism: Foundations and developments. *Electronic Markets*, 25(3), 179–188. <https://doi.org/10.1007/s12525-015-0196-8>

- Haradhan, K. M. (2019). The First Industrial Revolution: Creation of a New Global Human Era. *Journal of Social Sciences and Humanities*, 5(4), 377-387.
- Hermann, M., Pentek, T., & Otto, B. (2016). *Design principles for Industrie 4.0 Scenarios*. 49th Hawaii International Conference on System Sciences (HICSS) (pp. 3928–3927).
[https://www.europarl.europa.eu/RegData/etudes/STUD/2016/570007/IPOL_STU\(2016\)570007_EN.pdf](https://www.europarl.europa.eu/RegData/etudes/STUD/2016/570007/IPOL_STU(2016)570007_EN.pdf)
https://www.oecd-ilibrary.org/education/education-at-a-glance-2018_eag-2018-en
- Huang D., Wang X., & Zhang, B. (2018). *Review on application of artificial intelligence in photovoltaic output prediction*. In M. Qiu (Ed.), *Smart Computing and Communication*. SmartCom 2018. Lecture Notes in Computer Science, 11344 (pp. 281–290). Cham: Springer.
- Ivanov, S., & Webster, C. (2017, Oct). *Adoption of robots, artificial intelligence and service automation by travel, tourism and hospitality companies – a cost-benefit analysis*. Paper presented at International Scientific Conference “Contemporary tourism – traditions and innovations”, Sofia University, Bulgaria.
- Kevin Ashton. (1999). *IoT*<https://medium.com/@elodieriou/kevin-ashton-1999-iot-2ae600771beb>
- Manjari, R. M. (2018). *Introducing Tourism 4.0: What is It and How Do We Get Here?* <http://forbil.org/id/article/211/introducing-tourism-40-what-is-it-and-howdo-we-get-here>
- Michela Piccarozzi. (2018). Barbara Aquilani and Corrado Gatti. *Sustainability*, 10, 3821.
- Mulgan, G. (2006). The Process of Social Innovation. *Innovations: Technology, Governance, Globalization*, 1(2), 145–162.
<http://dx.doi.org/10.1162/itgg.2006.1.2.145>
- Nagy, J., Oláh, J., Erdei, E., Máté, D. & Popp, J. (2018). The role and impact of Industry 4.0 and the internet of things on the business strategy of the value chain—the case of Hungary. *Sustainability*, 10(10), 3491. <https://doi.org/10.3390/su10103491>
- Pascall, T. (2017). *Innovation and Industry 4.0. Disruption*, <https://disruptionhub.com/innovation-industry-4-0/>.
- Rifkin, J. (2014). *The zero marginal cost society: the internet of things, the collaborative commons, and the eclipse of capitalism*. New York, NY: Palgrave Macmillan.
- Schmitt, B., Brakus, J.J. & Zarantonello, L. (2015). From Experiential Psychology to Consumer Experience. *Journal of Consumer Psychology*, 25, 166-171. <https://doi.org/10.1016/j.jcps.2014.09.001>
- Schmitt, K. (2017). *Top 5 Reasons Why Industry 4.0 Is Real and Important*. Digitalist Magazine, <https://www.digitalistmag.com/industries/manufacturing-industries/2013/1>.
- Schwab, K. (2016). *The Fourth Industrial Revolution*. World Economic Forum.
- Treiblmaier, H. (2021). The token economy as a key driver for tourism: Entering the next phase of blockchain research. *Annals of Tourism Research*, 103177. <https://doi.org/10.1016/j.annals.2021.103177>
- UNWTO (2017). *Tourism highlights. 2017 Edition*. <https://www.e-unwto.org/doi/pdf/10.18111/9789284419029>