

# IMPLICATIONS OF INDUSTRY 4.0 AND THE COVID-19 PANDEMIC ON THE PERFORMANCE OF THE ECONOMIC ENTITY IN THE TOURISM SECTOR A CASE OF A TRAVEL AGENCY FROM SUCEAVA

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## Abstract

*This study aims to contribute to the academic landscape by exploring the interconnections between Industry 4.0 and performance in the tourism sector, with a focus on the impact of the coronavirus pandemic. Focusing on a specific case represented by a travel agency in the city of Suceava, we have adopted a mixed approach that integrates literature analysis, case study, and qualitative and quantitative research methods. Throughout this research, we will use the designation Travel Agency X to ensure anonymity and adhere to ethical standards in the field of research. Specifically, the investigative process focuses on analyzing how the coronavirus pandemic has accelerated the implementation of emerging technologies associated with Industry 4.0 and shaped consumer behavior. The in-depth case study of Travel Agency X involves direct observations, interviews with agency management, analysis of internal documents, and financial evaluation, thereby providing a holistic picture of the integration of emerging technologies into the agency's operations. It is essential to underline that this study is not without challenges and limitations. The subjectivity of the results may arise from the specific context of the investigated agency.*

**Key words:** *Industry 4.0, economic performance, tourism, emerging technologies, travel agency, Covid-19.*

**JEL Classification:** *Z32, O10, O3*

## I. INTRODUCTION

The Industry 4.0 paradigm, characterized by extensive digital interconnectivity and the profound integration of emerging technologies into industrial processes, fundamentally reconfigures contemporary economic activities, thus anticipating an inevitable global shift in the context of key technological innovations (Schwab, 2016).

Consequently, Romania's tourism industry is undergoing an accelerated process of transformation and expansion, shaped by both emerging technological innovations within Industry 4.0 and unforeseeable events, such as the coronavirus pandemic or the conflict in Ukraine.

Digitization and connectivity have revolutionized the way travelers search for and book experiences, intensifying the pressure for stakeholders in the tourism sector to adapt to these technological shifts.

The emergence of online platforms, changes in consumer behavior and the need for a solid digital presence are just some of the challenges that travel agencies, hotels and other entities in the field are advised to manage in their evolution towards an efficient business model in the era of Industry 4.0.

In addition to these challenges, there is an acute need to mitigate risk and forecast performance, all the more so due to the particularities of the tourism industry. These include: (a) the perishable nature of tourism products; (b) tourists' dependence on the production and consumption process; (c) customer satisfaction through complementary services; (d) the

vulnerability of demand to natural or human-induced disasters; (e) the necessity for significant and long-term investments in technology, equipment, and infrastructure for supply (Hapenciuc, 2004).

Therefore, an additional dimension comes into play in the process of understanding and evaluating the performance of an economic entity in the tourism sector, where traditional metrics need to be amalgamated with the ability to react and adapt to the rapid transformations occurring in the contemporary context.

## II. THEORETICAL DIMENSIONS REGARDING THE PERFORMANCE OF ECONOMIC ENTITIES

Performance is often associated with the ability of companies and markets to operate efficiently within a broader economy. However, it is imperative to assess the different approaches and interpretations of this concept within the specific context of each economic situation.

To better understand the notion of performance, especially in an economic and financial context, it is essential to consider that various categories of stakeholders may interpret this concept differently based on their specific interests and objectives.

In the case of tourism, for example, investors may associate performance with increased profitability and return on investment, while customers may view performance as the satisfaction of their experience. At the same time, the local community may define performance in terms of the economic and social

impact on the environment and residents (Hapenciuc et al., 2016).

In the specialized literature, there is a frequent presence of the concept of the performance of an economic entity, yet it is rarely clearly defined. Often, performance measurement is undertaken without a clear explanation of what is being measured, and the objectives of the measurement are not specified. The scope of different aspects of performance—technical, operational, economic, financial, social, etc.—is not precisely delineated. Another issue arises from the confusions generated by the diversity of notions used, necessitating a clear delimitation of the content of each concept to enhance the theoretical framework (Gruian, 2010).

### 2.1. Definition and evolution of the concept

According to the online Dictionary of the Romanian Language, performance is defined as an "outstanding result achieved by someone in a sports competition" or an "exceptional achievement in a field of activity."

As we move away from general definitions of performance and focus on specific ones, we find that this concept takes on a wide variety of meanings depending on the field of application.

Professors Bărbulescu and Băgu (2011) contribute to this debate by defining performance as "a certain level of the best results achieved by the enterprise" The same authors present a high-performance company model, outlining essential factors such as the resources required for production, work processes, organizational aspects, and business beneficiaries, also known as stakeholders.

On the other hand, the perspective of Bakó and Fülöp (2017) highlights that economic performance reflects the state of economic activity influenced by the specific consumption of resources to obtain an economic good within a certain time frame.

In a broader approach, the concept of performance has undergone significant transformations, reflecting deep changes in the evaluation paradigm over the past decades. Thus, In Table 1, four distinct periods have been identified, each marked by changes in the definition and understanding of performance.

**Table 1. The evolution of definitions of economic performance**

Period	Understanding of Performance
1950 – 1980	The concept lacks uniformity, manifesting through evaluation criteria such as productivity, flexibility, adaptability, capacity, environmental control, turnover, production costs, etc.
Late 1980 – 1990	Performance is determined by the extent to which set objectives are achieved.
1995 – 2000	Performance is established based on the degree of efficiency and effectiveness of the economic entity.
2000 – Present	Performance is defined in terms of value creation.

Source: Author's processing based on Pinteá (2011)

In light of the information provided in Table No. 1, an evolutionary perspective emerges regarding the understanding of the concept of economic performance. This progression highlights not only changes in the priorities of performance assessment but underscores the imperative of the ongoing adaptation of economic entities to significant changes in the operational environment.

## III. THE IMPACT OF INDUSTRY 4.0 ON ENTITY PERFORMANCE IN THE TOURISM SECTOR

In what follows, we aim to provide a comprehensive perspective on the notable impact that Industry 4.0 and its defining technologies exert on the performance of enterprises in the tourism sector. A profound understanding and coherent application of these innovative technologies can play a crucial role in enhancing the competitiveness and adaptability of tourism businesses, as they face an ever-changing environment and both current and future challenges.

### 3.1. Theoretical Dimensions of Industry 4.0

The concept of Industry 4.0 was introduced in 2011 by Klaus Schwab, the President of the World Economic Forum and author of the book *The Fourth Industrial Revolution*. This term describes a fundamental transformation of global value chains associated with the fourth industrial revolution (Berdieva, 2019).

The first industrial revolution marked the transition from manual labor to the use of machines, triggered by the invention of the steam engine. The second industrial revolution involved replacing steam engines with electric motors and was characterized by mass production and expanded transportation. The third industrial revolution was marked by the automation of production processes based on electronics and information technology (Schwab, 2016).

Among the pioneer countries to recognize the new industrial reality was Germany, with the strategic initiative 'Industry 4.0' (I40). Launched in 2011, the goal of this initiative is to promote digital production and interconnectivity in value chains and business models through research, industry partnerships, and standardization.

In general, Industry 4.0 is perceived as a "developing concept" and an "umbrella term" that encompasses a new industrial age. This paradigm involves advancements in cyber-physical systems, the Internet of Things (IoT), robotics, big data, cloud manufacturing, and augmented reality. The enumerated technologies contribute to the establishment of a smart manufacturing environment where systems and processes are interconnected, automated, and innovatively optimized for efficiency and performance (Pereira and Romero, 2017).

Over time, Industry 4.0 has captured the attention of an increasing number of countries and researchers, leading to developments in the perception and associated academic trends. There are subtle

differences between the terms "Fourth Industrial Revolution" and "Industry 4.0," with arguments suggesting that the former denotes a new stage of industrial development characterized by fundamental changes in technology, processes, and business models, with a global impact that generates risks, threats, and opportunities. On the other hand, Industry 4.0 refers to a management concept and a development program aimed at gaining competitive advantages in the industry through the use of advanced technologies and adaptation to global challenges (Berdieva, 2019; Schwab, 2016).

It is important to recognize that perceptions and interpretations can vary depending on context, expertise, and individual interests. However, both Industry 4.0 and the Fourth Industrial Revolution represent a paradigm shift in technology, manufacturing, and business. This transformation brings opportunities for innovation, efficiency, and economic growth, but it also poses challenges in terms of employment, ethics, and environmental impact.

### 3.2. From Industry 4.0 to Tourism 4.0

The advancements brought about by Industry 4.0 also extend into the service sector, including tourism, where Tourism 4.0 represents an innovative and promising approach. Tourism 4.0 aims to enhance added value in the tourism industry by utilizing advanced technologies associated with the I40 concept, with objectives such as efficiency in the tourism sector, staff development, and collaboration among stakeholders (Goriup and Ratkajec, 2021).

Tourism 4.0 goes beyond e-tourism and m-tourism, focusing on harnessing massive data collected from travelers to create personalized experiences, integrating advanced and innovative technologies into tourism processes and services (Manjari, 2018). E-tourism involves the digitization of tourism entities and the use of the internet to provide tourism services, while m-tourism entails the use of mobile devices for tourism-related interactions.

The importance of this new paradigm has been recognized at the European Union level. According to information presented on the European Commission's website, Slovenia was the first country to launch the "Tourism 4.0 Living Lab," a pilot project demonstrating the potential of Tourism 4.0 in a real-world setting. The purpose of this project is to investigate how technologies such as virtual and augmented reality can be used to help potential visitors make informed decisions about tourist destinations and provide additional experiences in places with historical value. This initiative underscores Slovenia's commitment to adopting technological innovations in the tourism industry and serves as a model for other European countries in the implementation of Tourism 4.0 (European Commission, 2021).

According to the Tourism 4.0 Living Lab, the key technologies of Industry 4.0 can significantly contribute to the development of tourism, transforming

it into an engine for the Sustainable Development Goals pursued by UNWTO and the UN (Tourism 4.0 Partnership, 2018).

### 3.3. Key technologies of Industry 4.0. Application in tourism

Industry 4.0 is characterized by its potential to transform the functioning of businesses and society as a whole. The specific technologies of Industry 4.0 are interconnected and collaborate synergistically. These technologies include the Internet of Things (IoT), data analytics, artificial intelligence, collaborative robots, and others (Figure no.1), which are integrated to form Cyber-Physical Systems (CPS).

The interconnection of Industry 4.0 technologies has a significant impact on the tourism sector, bringing a range of innovative benefits and opportunities. This interconnection enables the creation of an advanced tourism environment, where digital and physical technologies collaborate to enhance traveler experiences and streamline operations in the tourism industry.

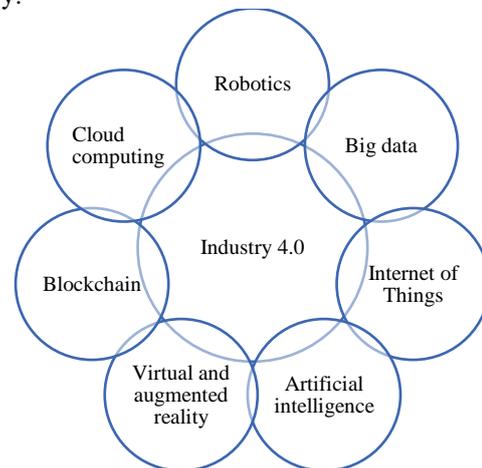


Figure 1. Industry 4.0 technologies

Source: The author's processing based on the studied works

#### 3.3.1. Internet of Things (IoT)

The Internet of Things (IoT) represents an ecosystem of intelligent devices connected to the internet, equipped with processors, sensors, and communication hardware. These devices collect, transmit, and act upon the data in their environment. They can share data through an IoT gateway or other peripheral devices for local or cloud-based analysis. In some cases, devices communicate with each other and take actions based on the received information. Typically, these devices operate autonomously without human intervention, but users can access them for configuration, instructions, or data access (Gillis, 2022).

Thus, IoT involves equipping objects or even living organisms with embedded technology (sensors, biochips, implants) to communicate and interact with their internal or external environment (Gartner, 2023), providing a global infrastructure for the development

and delivery of advanced services by interconnecting physical and virtual objects (ITU, 2015).

The Internet of Things has numerous applications in the tourism sector, with capabilities for enhancing various aspects. These include customizing customer experiences through centralized control of technology and services in hotels, planes, and trains. Additionally, IoT streamlines a hassle-free journey by sending information to passengers' smartphones, enabling quick location of luggage or hotel check-ins (Revfine, 2020a). IoT also contributes to intelligent energy conservation by adjusting temperature and lighting based on actual needs. Simultaneously, it provides location-specific information, delivering relevant messages to tourists about nearby attractions and services. Furthermore, IoT enables real-time monitoring and maintenance of devices, preventing malfunctions and ensuring their optimal functioning (Verma, Shukla, & Sharma, 2021).

### 3.3.2 Artificial intelligence

A broadly applicable definition of Artificial Intelligence (AI) is the "ability of a system to correctly interpret external data, learn from that data, and use the knowledge acquired to achieve specific goals and tasks through flexible adaptation" (Kaplan and Haenlein, 2019).

In other words, AI involves the development and implementation of algorithms and computational models that can perform specific tasks, imitating human cognitive abilities such as learning, problem-solving, and interpreting natural language and images (Dwivedi, Hughes et al. 2019).

There are two main types of artificial intelligence: AI in software and embedded AI. AI in software refers to AI applications that are implemented and utilized in software programs (virtual assistants, image analysis tools, search engines, and voice and facial recognition technologies). Embedded AI refers to the integration of AI into devices and systems (robots with advanced functionalities, autonomous vehicles, autonomous drones, and the concept of the Internet of Things (IoT), which involves interconnected and intelligent objects) (Bejinaru & Balan, 2020). By embedding AI into these devices, they become capable of collecting and interpreting data, learning from experience, and making autonomous decisions or performing specific tasks without constant human intervention (European Parliament, 2020).

The use of artificial intelligence in the tourism industry is expanding across various domains, bringing improvements to customer experiences and significant benefits to business operations.

The following is a synthesis of how AI is applied in tourism: (1) Recommendation Systems: AI algorithms analyze user preferences and behavior to suggest personalized offers and options, enhancing the travel experience and facilitating decision-making; (2) Operational Efficiency and Data Analysis: AI models can train staff and boost sales through cross-selling

offers, while dynamic pricing technology adjusts prices in real-time by identifying purchasing patterns; (3) Security and Fraud Detection: AI tools analyze data and identify abnormal behaviors, ensuring the security of online transactions by detecting potential fraud; (4) Customer Interaction: AI-powered chatbots and online assistance provide an efficient communication channel with customers, offering real-time support and information, as well as resolving travel-related issues (Pillai and Sivathanu, 2020; Chawla, 2019; Revfine, 2020b).

### 3.3.3. Virtual Reality

Virtual Reality (VR) involves the use of computer-simulated environments to create interactive and immersive experiences (Gutiérrez et al., 2008, as cited in Guttentag, 2010). VR generates three-dimensional virtual environments in which users can interact and navigate (Guttentag, 2010). This allows the manipulation of virtual objects, exploration of scenarios, and the simulation of user senses.

VR finds applications in the tourism industry, including planning, marketing, entertainment and education (Takada et al., 2022). VR technology provides direct information and personal experiences for customers, motivating them to travel and experience services (Samala et al., 2022). Through VR, tourists can explore tourist sites, discover inaccessible locations, or travel to fantastical worlds. Despite concerns regarding authenticity and the impact on economies dependent on tourism, the acceptance of VR as a substitute for tourism depends on individual preferences (Beck et al., 2019).

However, there are concerns regarding the impact of VR on countries that rely on tourism revenues. The authenticity of virtual travel experiences can be a problem, and the acceptance of VR as a substitute for traditional tourism depends on the preferences and receptiveness of individual tourists (Beck et al., 2019).

### 3.3.4. Augmented Reality

Augmented Reality (AR) is a technology that overlays virtual objects onto the real world, creating a composite perspective. It provides a real-time, direct or indirect view of the physical environment in the real world, enhanced by the addition of computer-generated virtual information (Azuma et al., 2001, as cited in Alzahrani, 2020). Through devices such as smart glasses, mobile phones, or tablets, AR adds information, images, or virtual objects within the context of the real view.

This technology is based on three distinct principles: (1) the integration of the real and the virtual, where virtual information is added over the real surrounding environment; (2) real-time interaction, meaning we can interact and manipulate these virtual elements instantly; (3) 3D registration, which allows precise positioning and anchoring of virtual objects in the physical environment, involving the capture and detailed recording of the surrounding environment in a

three-dimensional format using various technologies (Ye et al., 2003, cited in Mohanty et al., 2020).

In tourism, AR technologies are widely used, and smartphones remain the most popular devices for AR due to their accessibility and technological performance. The high-quality cameras, gyroscopes, compasses, accelerometers, processors, touch screens, and integrated sensors of smartphones have facilitated the development of enhanced AR experiences (Sevim and Çalişkan, 2021).

### 3.3.5. Blockchain

Blockchain represents a global concept that designates ledgers allowing data storage, often in the form of transactions, using a distributed approach (Treiblmaier, 2021). These transactions are stored in an interconnected chain of blocks, and the chain continues to expand and grow as new blocks are added. Key features of blockchain technology include decentralization, persistence, anonymity, and auditability (Zheng et al., 2018).

The technology eliminates intermediaries and increases the efficiency of transactions, while ensuring transparency and security through the use of a cryptographic protocol and encrypted messages (Tham and Sigala, 2019).

Blockchain technology has significant potential in tourism, enabling the secure recording and storage of tourist information to avoid data manipulation and falsification. Through smart contracts, business processes can be simplified and automated, reducing costs and increasing efficiency (Pranita et al., 2023). The use of blockchain also ensures a secure environment for online payments and prevents financial fraud (Wei, 2022).

Traveler identity management is enhanced by blockchain, giving tourists greater control over personal data and efficient management of tourism activities (Pranita et al., 2023). In the supply chain, blockchain improves transparency and accountability by providing detailed information on the provenance and quality of tourism products and services (Puri et al., 2023).

### 3.3.6. Robots

Industry 4.0 and the use of robots have the potential to revolutionize any field and bring significant benefits in terms of efficiency, performance and competitiveness (Javaid et al., 2021). Robots are automatic systems or machines capable of performing physical and/or cognitive activities autonomously or semi-autonomously. They are designed to perform various tasks and operations, being used to increase efficiency and productivity in various fields and to replicate or replace human actions (Daley, 2022).

There are multiple advantages to using robots in the tourism industry. These machines can streamline workflows and take on repetitive and monotonous tasks, allowing human staff to focus on interacting with customers and handling more complex aspects of

tourism services (Samala et al., 2022). Robots are employed in airports to assist passengers by providing information, aiding in luggage handling, and ensuring security. Humanoid robots are designed to communicate both verbally and non-verbally, ensuring a more natural interaction with people. Moreover, in the context of the COVID-19 pandemic, robots have played a crucial role in maintaining health and safety measures, contributing to the disinfection and sterilization of spaces and monitoring high-risk areas (Meidute-Kavaliauskiene et al., 2021).

There is a growing trend among companies in the tourism and hospitality industry, such as Hilton Worldwide and Starwood, to incorporate robots in various roles for service delivery. These roles include robot concierges, robot waiters, and robot butlers capable of delivering goods and facilitating communication with the hotel system (Park, 2020).

It's worth noting that the automation of services in tourism will lead to new consumer habits, especially in the service industry, providing innovative solutions to customers who consistently seek additional attractions and services. However, integrating robots into a complex service system involves not only employees and customers but also often entails expensive physical and informational technological infrastructure (Fusté-Forné, 2021).

### 3.3.7. Cloud computing

According to the National Institute of Standards and Technology (NIST), cloud computing is defined as "a model that enables networked, on-demand, universal, convenient, and configurable shared computing resource (such as networks, servers, storage, applications and services) that can be quickly provisioned and released with minimal management effort or service provider interaction" (Mell and Grance, 2011).

There are three main models for delivering cloud computing services: (1) Software as a Service (SaaS) represents a collection of software, services, or applications available in the cloud, accessible to end-users on a subscription basis (examples include WhatsApp, Facebook, Google Docs, Salesforce, etc.); (2) Platform as a Service (PaaS) involves providing execution environments and development tools hosted on the provider's servers. This model facilitates the development, testing, and deployment of applications (examples include Amazon AWS, Google App Engine, Microsoft Azure, etc.); (3) Infrastructure as a Service (IaaS) involves the provision of virtualized servers, storage, and networks. Users can access these resources through a virtual desktop and are charged based on their usage (examples include VMWare, Amazon EC2, Rackspace, etc.) (Birje et al., 2017).

The use of cloud computing and virtualization in the tourism industry brings multiple benefits, including the simplification and efficiency improvement of storage and network resource management (Nadda et al., 2020). Tourists can explore travel destinations through

virtual visits, accessing multimedia content and virtual experiences available online, such as 3D virtual tours, video presentations, or interactive photos. Cloud computing in the tourism sector offers significant cost savings, remarkable adaptability, unparalleled flexibility, centralized data management, enhanced customer services, and increased security (Intellias, 2023).

### 3.3.8. Big data

Big data is a term that describes the vast volume and complexity of data continuously generated from various sources, such as mobile devices, social networks, sensors, vehicles, and many others (Chang and Grady, 2019).

According to Abu-Salih et al. (2021), Big data has 10 essential characteristics: rapidly growing data volume, rapid real-time accumulation from diverse sources, collection of data from various and different formats, data veracity regarding their origin and accuracy, variability in meaning and dimensions, data validity for various applications, data security vulnerability, volatility in the relevance and use of data, data visualization for better understanding and interpretation, and the value of results obtained through the analysis of these massive datasets.

The use of Big Data in the tourism industry has significantly increased and has a strong impact on research, planning, and decision-making at the strategic, organizational, and operational levels (Ly, 2019). Data from search engines and services like Google Trends and Baidu Index play a crucial role in tourism research, allowing for the estimation of tourism volume at various geographical levels (Peters and Keller, 2022).

According to the Asian Development Bank and the World Tourism Organization (2021), there are 9 significant types of data in the tourism industry: inventory data providing information on price trends and product descriptions, aiding in tailoring marketing efforts and forecasting demand; loyalty program data offering insights into the relationship between incentives and consumer buying behavior, as well as their long-term purchasing habits; reservation data helping assess the success of campaigns, user experiences, and facilitating targeted advertising efforts; identification data contributing to the creation of targeted marketing audiences based on demographic, psychographic, and interest characteristics; web analytics data measuring, collecting, analyzing, and presenting information about website usage; search data valuable for understanding customer buying intent and providing relevant travel products; travel reviews providing clues about travelers' sentiments regarding specific experiences, destinations, or brands; social media content aiding in analyzing user behavior, grouping them based on interests, and gaining insights from shared content; and operational data generated by organizations and machines from various assets such as planes, cars, and hotel equipment, providing clues for improving operations and performance.

However, there are aspects that limit the use of all the benefits of big data: (1) accessing and analyzing big data information is often expensive and challenging, as it is owned by third parties; (2) the use of Big Data in tourism raises ethical dilemmas such as data privacy and security because, the existence of adequate supervision and regulation in tourism is still limited (Peters and Keller, 2022).

### 3.4. The COVID-19 Pandemic and the Digital Paradigm of Tourism

The COVID-19 pandemic has undoubtedly been the black swan event of the 21st century, a term introduced by author Nassim Nicholas Taleb (2010) to describe rare, unpredictable events with a significant impact on society, capable of changing the course of development and causing profound consequences. In a society based on new technologies and continuous development, COVID-19 has functioned as a historical accident, dramatically affecting the normal course of evolution and demonstrating how vulnerable modern society can be to such an event. It has generated disruptions on a global scale in areas such as health, economy, education, and, in our context, the tourism industry.

According to the Asian Development Bank and the World Tourism Organization, "the COVID-19 pandemic has generated irreversible digital changes with a lasting impact for all economic categories and various types of businesses" (ADB and UNWTO, 2021). Digital technologies were essential in addressing the challenges created by the pandemic and ensuring the continuity of economic and social activities. The digital divide between different states has become evident, and the necessity to connect people and ensure access to technology has become a priority (Sudas and Yudina, 2021). From the migration of businesses to the online environment to the adoption of remote work and virtual collaboration solutions, the pandemic has driven the adoption of digital technologies at an unprecedented pace. New business models based on technology and innovation have been developed, and digitization has become a strategic priority for many entrepreneurs and leaders. Thus, the pandemic has acted as a catalyst for accelerating the adoption and implementation of Industry 4.0 technologies, involving the extensive use of automation, the Internet of Things, data analytics, and other digital technologies in production processes and economic activities in general.

Through the use of artificial intelligence, the Internet of Things, big data, and other digital solutions, Industry 4.0 has enabled wireless connectivity, automation, and communication among stakeholders in different fields. It has facilitated the rapid manufacturing of medical equipment and objects, the assessment and management of infection risks, remote monitoring and surveillance of patients, real-time information delivery, and the facilitation of remote communication and collaboration. These technologies have contributed to the improvement of healthcare

services, the optimization of manufacturing processes, and the efficient management of the pandemic (Javaid et al., 2020).

For the tourism industry, the COVID-19 pandemic has had a devastating impact, triggering radical changes in the way this sector operates and imposing the need for rapid adaptation to the new conditions. Travel restrictions have led to the complete halt of international tourism, and the cancellation of flights and hotel bookings has severely affected all branches of the tourism sector. Additionally, major sports events and international tournaments have been canceled or postponed, resulting in significant losses for organizers and other involved parties. Moreover, the tourism industry has suffered massive revenue losses, impacting national and regional economies (Matikiti-Manyevere and Rambe, 2022).

Profound changes in the economic paradigm and working methods have created a new normality where technology plays a central and essential role in the success and resilience of businesses. Human interactions have shifted towards digital experiences, and managers in the tourism sector have recognized the importance of digital transformation. They have considered the travel history, preferences, and behavior of customers to provide personalized experiences.

The use of digital technology in the aviation sector, such as facial recognition for quick check-ins and mobile applications for customer communication, has become indispensable in efficiently managing communication and meeting hygiene and health requirements (Waramontri, 2021).

Virtual reality has represented an innovative solution to allow tourists to explore and experience tourist attractions in a virtual manner, eliminating the need to be physically present. Virtual tours have provided a way to sustain activity in the tourism sector, even in crisis situations like the pandemic, enabling virtual visits to religious sites or historical monuments.

At the same time, automation technologies through robots have been implemented in the hotel industry to ensure cleaning services, room service, or even to function as waitstaff, thereby contributing to maintaining social distancing and preventing the spread of the virus. 5G technologies and artificial intelligence have also provided significant advantages in the hotel industry, facilitating quick check-ins through facial recognition, enabling contactless payments, and non-invasive body temperature measurements. The implementation of AI-powered digital assistants has allowed for quick responses to guest inquiries, facilitating contactless orders, and managing crowd control (Matikiti-Manyevere and Rambe, 2022).

As we adapt to a new normality with ongoing uncertainties and challenges, digital technologies and innovations brought by Industry 4.0 will continue to play an essential role in transforming and revitalizing the tourism industry. Process automation, the use of data analytics for personalized offerings, the integration of artificial intelligence to enhance tourist

experiences, and the use of virtual reality for destination promotion will contribute to regaining travelers' confidence and stimulating economic growth in the tourism sector.

The COVID-19 pandemic has generated profound changes in society and the tourism industry. Accelerated digital transformation and the adoption of Industry 4.0 technologies have become a priority for the survival and success of industry businesses. The pandemic brought opportunities and challenges, forcing the tourism industry to quickly adapt to new conditions and find innovative solutions to rebuild and revitalize its business. However, technology cannot completely replace authentic human experiences, and the relationship between traveler and destination remains an essential aspect of the tourism industry. Therefore, finding a balance between technological innovation and providing authentic and memorable experiences will be key to the recovery and success of the tourism industry in the post-pandemic era.

#### **IV. TRAVEL AGENCY X IN THE POST-COVID-19 ERA. EXPLORING CONSUMER BEHAVIOR, PERSPECTIVES AND CHALLENGES IN THE CONTEXT OF INDUSTRY 4.0**

In the post-COVID-19 era, travel agencies confront unparalleled challenges alongside opportunities for innovation and expansion. Travel Agency X, where I gained valuable professional experience, recognized the significance of adjusting to shifts in consumer behavior and is actively exploring the potential presented by Industry 4.0 to optimize its performance.

In this scenario, the increasing adoption of technology in the workplace presents a substantial challenge to leadership capabilities. Managers are urged to strengthen both their technical and interpersonal skills in order to adeptly navigate the complexities of digitization and guide their team to success (Bejinaru and Balan 2020).

##### **4.1. The organization of Travel Agency X**

Travel Agency X, established in 2015, operates in the city of Suceava. Over the course of 8 years of activity, the agency has built an impressive reputation in the tourism industry in the Suceava and Botoșani regions, as well as in neighboring areas. Its appreciation and recognition are confirmed by a significant number of tourists, exceeding 15,000, who have benefited from the services provided for trip organization and assurance.

Particularly noteworthy is the customer satisfaction rate, reaching 97%, reflecting a high level of contentment with personalized tour packages, consulting services, and support. Through the efficient use of the online environment and social networks, the agency has strengthened its position as one of the most popular entities in the tourism sector, actively engaging in the media space.

#### 4.1.1 Analysis of Economic and Financial Performance

Analyzing the evolution of the turnover over multiple financial periods is a crucial method in assessing the performance of a company. This analysis enables the identification of dominant trends in the company's activity and can reveal valuable information about its growth or decline, stability, and development pace (Bîrsan and Şuşu, 2013).

Net profit is the result of economic activity and reflects the complex interdependencies within it. It is considered both an essential premise and a concrete outcome of the efficient operation of a company, as it reflects its ability to generate income after deducting all expenses and taxes (Bîrsan, 2020).

**Table 2. Net Profit and Turnover 2017-2022**

Financial Year	2017	2018	2019	2020	2021	2022
Net Turnover (K/RON)	140895	226874	295273	69124	251245	485313
Turnover Evolution (%)	-	61,02	30,15	-76,59	263,47	93,16
Net Profit (K/RON)	87716	138079	173387	9855	463168	629101
Profit Evolution (%)	-	57,42	25,57	-94,32	4599,83	35,83

Source: Author's processing based on information on the website of the Ministry of Finance

In Table No. 2, it can be observed that the agency experienced a significant increase of turnover during the period 2017-2019, indicating a positive development in its activities. However, in 2020, the turnover decreased significantly (-76.59%), and this decline is attributed to the negative impact of the COVID-19 pandemic on the tourism industry. This substantial decrease reflects the challenges faced by the agency in that year, given the travel restrictions and general uncertainty in the industry.

Therefore, Table No. 2 shows a substantial increase in net profit in the years 2018, 2019, and 2021, reflecting an improved financial performance of the agency. However, in 2020, net profit decreased significantly (-94.32%), highlighting the negative impact of the pandemic on financial results. It is important to note that, despite the challenges faced in 2020, the agency managed to return to a significant increase in net profit in 2021.

#### 4.2. Exploring Consumer Behavior in the Post-COVID-19 Era

As a result of in-depth analyses and dialogue with the agency's founders, we have inferred that the Covid-19 pandemic has brought about significant changes in consumer behavior, especially regarding their choices in tourism services. This observation has served as a crucial impetus for a detailed investigation, aiming to determine whether these transformations are specific to Agency X or reflect a general trend within the tourism industry.

#### 4.2.1 General Aspects Regarding the Consumer Behavior of Tourism Services

The factors influencing consumer behavior in tourism can be categorized into four main groups: (1) Cultural factors are determined by the consumer's culture and influence their values, perceptions, and preferences; (2) Social factors include the influences of reference groups, such as family and other groups with whom the consumer interacts; (3) Personal factors, such as age, occupation, and lifestyle, influence preferences and consumption behavior; (4) Psychological factors, such as needs, perceptions, and attitudes, play a significant role in consumer decisions (Tien et al., 2021).

Additionally, there is another approach where influences on consumer behavior in tourism are divided into two categories: internal influences and external influences. In the category of internal influences, sustainable values guide individual preferences and choices, followed by motivation, which refers to the psychological and biological needs and desires that determine behavior. Self-awareness and personality influence choices that align with an individual's self-perception. Expectations affect satisfaction levels, and consumer perceptions are influenced by their expectations, previous experiences, values, and motivations. Finally, satisfaction and trust are key concepts in consumer behavior, playing a crucial role in forming loyalty and developing relationships with providers of tourism services.

In the category of external influences: Technology plays a significant role in consumer behavior in tourism. The use of technology, especially social networks, has a strong impact on information search, the buying process, and the sharing of opinions and experiences among consumers. Additionally, Generation Y and Z, consisting of tourists born between 1982 and 2002, are a significant economic group in the tourism industry with distinct preferences and behaviors. Simultaneously, the increasing ethical concerns in tourist consumption influence consumer behavior, and ethical consumption in tourism involves decision-making influenced by consumers' ethical concerns, such as supporting fair trade and promoting sustainable consumption (Cohen et al., 2014).

#### 4.2.2 Transformations of Consumer Behavior in the Post-COVID-19 Era

According to the founders of the agency, the pandemic has brought about significant changes in the travel decision-making process. Tourists exhibit a greater aversion to risk and seek to ensure their safety and health before embarking on travel. Real-time information and pre-travel advice have become essential.

With the progress of vaccination and the easing of restrictions, a perspective of recovery has emerged in the tourism industry. Coordination between countries regarding travel protocols and the use of digital tools to ensure safe mobility has become key for an efficient

recovery. Overall, the pandemic has led consumers to reassess their preferences and place increased importance on health and safety in travel, thereby influencing their behavior in the post-COVID-19 era (Santos, 2022).

According to research, the changes in consumer behavior in the post-COVID-19 era regarding tourism services include the aspects mentioned in Table no.3.

**Table 3. Travelers Behavior in the Post-COVID-19 Era**

Features	Description
1	Priority given to safety and physical survival The need for safety and physical survival became prioritized over recreational needs; Travelers avoid crowded areas and seek less touristy destinations where they can maintain physical distance and avoid too close contact with other tourists.
2	Influences of situational factors Travelers feel anxious due to the impact of the pandemic on themselves and their families, and government policies and safety measures influence purchasing decisions.
3	The need for benefits in terms of utility and pleasure Travelers make purchasing decisions based on the need for utility and pleasure benefits; They focus on protecting comfort through cleanliness, health, and safety.
4	The importance of flexibility in bookings and cancellation policies Travelers are looking for flexible cancellation policies and options that allow them to adjust their plans as the situation evolves; Flexibility in reservations is considered important to avoid risks and to adapt to unexpected changes.
5	Use of technology and mobile applications Travelers use mobile technology and apps to search for up-to-date information on destinations, safety measures, bookings and contactless payments.

Source: Author's processing based on Fitriadi et al. (2021) and Tien et al. (2021)

To the points mentioned above, we would like to add our own insights and observations regarding the changing consumer behavior in the post-COVID-19 era, based on our professional experience within Travel Agency X and discussions with the owners. We have identified the following aspects:

As a result of the pandemic, within the agency, a significant increase in the purchase rate of travel insurance and cancellation insurance has been observed. This trend reflects the customers' need to feel secure in the event of health issues or unforeseen situations that could impact their travel plans. Thus, consumers are more interested in protecting their financial investment and ensuring that they can receive adequate support in case of unforeseen circumstances.

At the same time, the considerable increase in the rate of customers requesting personalized trips, such as

city-breaks or holiday packages made from combined services, was noted.

After the relaxation and complete removal of restrictions, there has been a significant increase in interest in tourism services in general. After a period when travel was severely affected and restrictions significantly reduced tourism activity, the resumption of travel has generated increased demand from consumers. This can be interpreted as a sign of returning confidence in travel and an increased desire to explore and experience new destinations.

In this context, it is particularly important for X Travel Agency to maintain the relationship with existing customers and attract new customers through the new methods and technologies available in the tourism industry.

### 4.3. Exploring the Potential of Industry 4.0 within Travel Agency X

#### 4.3.1. Current Achievements

In addition to the emerging technologies specific to Industry 4.0, this concept refers to the integration of digital technologies and automation into work processes to increase efficiency, innovation, and productivity (Schwab, 2016).

In line with these principles, the agency has implemented the eTrip Agency reservation operating system to take advantage of the benefits provided by this modern solution.

The eTrip Agency system is a software based on Industry 4.0 technology and adopts a cloud-based deployment model, providing numerous advantages. Accessibility is one of the main strengths of the software, as it can be accessed from anywhere, regardless of location, through internet-connected devices. This aspect offers exceptional flexibility, allowing employees to manage information in real-time, irrespective of their location or time zone. Additionally, the use of cloud technology eliminates the need to invest in expensive physical infrastructure and in the management and maintenance of local servers. By storing and processing data in the cloud, eTrip offers excellent scalability, enabling quick adaptation to the ever-changing needs of the travel agency (etrip-agency.ro, 2023).

The use of the eTrip Agency system has had a significant impact on how agency employees dedicate themselves to customer support. By automating billing and contracting processes, administrative and routine work has become easier and more efficient. Employees have gained valuable time, which can now be dedicated to interacting with customers and providing quality support. Additionally, the ability to integrate with major tour operators and other partners can ensure data synchronization and more efficient collaboration in the tourism industry.

The Travel Fuse platform is another technological innovation implemented by the agency, aligning with the Industry 4.0 paradigm through data analysis and the

use of advanced algorithms (travelfuse.ro/ro\_ro/, 2023).

Travel Fuse is a platform that provides website maintenance services for Tourism Agency X, with the ability to integrate all suppliers. Through data analysis, Travel Fuse offers valuable support for both customers and employees in identifying the most suitable vacation packages, presenting them in ascending order based on price, destination, hotel star rating, and other relevant categories.

The platform enables the efficient management of offers and relevant information on the website, providing access to its backend. The intuitive and user-friendly interface allows for the addition, editing, and updating of vacation offers.

Another benefit of Travel Fuse is the ability for customers to book vacations directly through the agency's website. Through the platform, users can conveniently and quickly make reservations by selecting their desired travel options and completing the booking process seamlessly.

Another essential tool that aligns the agency with the Industry 4.0 paradigm is the Google Drive platform. This technological solution provided by Google plays a crucial role in optimizing internal processes.

Google Drive is a cloud-based document storage and sharing platform offered by Google. It enables the agency to store, organize, and access documents and files from any internet-connected device. It is a practical and efficient solution for information management, eliminating the need for expensive physical infrastructure for document storage and management.

The use of Google Drive within a travel agency brings multiple benefits. Firstly, it allows quick and easy access to essential information and documents at any time and from anywhere, whether employees are in the office, in the field, or on a business trip. This mobility and accessibility facilitate communication and collaboration among team members, as well as with clients and business partners.

Another valuable feature of Google Drive is the ability for real-time sharing and collaboration. Employees can invite colleagues to work together on the same documents, ensuring everyone is updated with the latest changes and can actively contribute to common projects. This enhances internal communication and efficiency in task resolution, reducing the time and effort required to complete them.

Moreover, Google Drive integrates other useful tools from the Google ecosystem, such as Google Docs, Google Sheets, and Google Slides. These applications enable collaborative and efficient creation, editing, and sharing of documents, spreadsheets, and presentations. Consequently, the agency's team has all the necessary tools to perform their daily tasks quickly and professionally (GCFGlobal.org, 2023).

Another frequently used tool within the analyzed company is Google Maps. The use of this application contributes to improving precision and customer

satisfaction, providing them with a smoother and more efficient experience in planning and organizing trips. This application benefits from connectivity, data analysis, and cloud services, which are features of the Industry 4.0.

Google Maps provides detailed information about locations, routes, and real-time traffic, allowing the agency to offer customers precise and up-to-date information to optimize their travel plans.

Travel Agency X focuses on innovation and customer satisfaction, efficiently utilizing virtual tours to enhance customer experience and assist them in making informed decisions regarding the purchase of travel packages.

Through virtual tours, customers can explore in detail every aspect of the hotel, from room design and amenities to facilities such as pools, restaurants, or spas. They can also discover major tourist attractions and points of interest of the destination, getting familiar with them before embarking on their journey. This allows customers to make informed decisions about travel packages, having a realistic and detailed view of locations and services. This contributes to building trust for the agency, providing tourists with the opportunity to feel more secure in their choices (Rouse, 2015).

Additionally, the use of virtual tours reduces the time and costs associated with inspection trips and visits to locations, both for customers and the agency.

A modern approach to customer communication within the agency is the Facebook page messenger chatbot. This chatbot has been programmed to greet customers warmly and assure them that their issue will be addressed by an employee as soon as possible, providing a personalized solution.

Through this chatbot, the agency enhances its customers' experience by delivering a quick and efficient response to their requests. The chatbot handles the initial greeting and forwards the message to the competent employees, freeing up human resources to focus on solving complex issues and providing personalized support. As a result, the customer receives the attention and support needed in the shortest time possible.

However, despite falling under the Industry 4.0 paradigm, the current chatbot implemented on the agency's Facebook page messenger fails to fully leverage the potential of this paradigm in resolving customer issues.

Internet of Things (IoT) technology is adopted within the company to enhance the security system and provide efficient monitoring of the headquarters. A key component of this system is represented by internet-connected surveillance cameras. These cameras allow the agency's owners to have real-time access to images and video recordings from any internet-connected device.

Through IoT, owners can oversee activities in the agency and react promptly to any incident or unexpected situation. The integration of IoT into the security system demonstrates a commitment to

ensuring a safe and trustworthy environment for customers and property. The use of this advanced technology not only reinforces the agency's security but also provides owners with a high level of control and accessibility in managing surveillance activities.

The listed technologies have contributed to streamlining work processes, increasing efficiency and productivity, improving customer satisfaction, and strengthening the position in the tourism market. Through these technological solutions, the agency has succeeded in offering an interactive, personalized, and secure experience to its customers, adapting to the current requirements and trends of Industry 4.0.

#### **4.3.2. Perspectives and Challenges in Exploring the Potential of Industry 4.0 by Travel Agency X**

In the rapidly evolving context of technology and the ever-changing requirements of consumers, the agency is in a favorable position to strengthen and expand the use of Industry 4.0 concepts and technologies.

The future perspective in exploring the potential of Industry 4.0 includes the expansion of artificial intelligence (AI) usage within the agency's operations. Implementing AI is an efficient strategy to provide personalized services and relevant recommendations based on customers' preferences and history. Through the use of AI, the agency can enhance customer satisfaction and ensure their loyalty in a competitive market.

A concrete example of integrating AI within the agency would be the introduction of an AI-based chatbot on its website. This implementation would bring numerous benefits and significant improvements to the customer experience. One of the major advantages of an efficient chatbot is its non-stop availability. Regardless of the time zone or the agency's schedule, customers can benefit from instant assistance and real-time updates. This approach directly contributes to increasing customer satisfaction and enhancing the quality of services provided by the agency.

By properly configuring the chatbot, repetitive tasks and common requests can be handled, freeing up time and resources for the agency's employees. Instead of dealing with routine questions and requests, the staff can focus their efforts on more complex tasks and delivering high-quality service to customers. Additionally, the chatbot can be programmed to provide personalized recommendations and present travel offers and packages based on the preferences and needs of each client. This approach would contribute to creating a personalized and relevant experience, thereby increasing the likelihood of customer loyalty.

Another recommended practice is diversifying the responses of the chatbot on the agency's Facebook page. The chatbot can be configured to provide prompt and varied answers to frequently asked questions, as well as to offer information about destinations, travel

recommendations, and other tourism-related aspects. By providing relevant and engaging responses, the chatbot can attract and maintain users' interest, ultimately generating potential bookings.

In a period where Industry 4.0-related technologies are becoming increasingly prevalent in the field of tourism, agencies such as the one studied face challenges related to the costs and infrastructure required for the implementation of these advanced technologies. Therefore, access to free resources, such as websites and applications with virtual tours, plays a crucial role in the development and growth of the agency.

Although the company has already adopted the use of virtual tours to assist tourists in the decision-making process, integrating these virtual tours directly onto the agency's website would bring significant benefits, enhancing the level of customer information and facilitating travel decision-making. This would create a captivating and realistic experience, facilitating the exploration of key attractions, facilities, and the ambiance of places before the tourist makes a final decision regarding the trip.

Additionally, the agency can take advantage of the freely available emerging technologies to educate and inform its existing customer base. Utilizing mobile applications or other platforms with free virtual tours can be an efficient method to provide customers with a detailed perspective on the services and destinations offered.

Travel Agency X aims to stay abreast of technological innovations and explore the potential offered by emerging technologies in the field of tourism. However, accessing and implementing these technologies do not come without challenges. Below, we outline the main challenges faced by the agency in accessing emerging technologies:

**Associated costs:** Adopting emerging technologies can involve significant costs. The acquisition of appropriate equipment and infrastructure, as well as the development and implementation of technological solutions, may require substantial financial investment. The agency must find the necessary resources to enable the implementation of these technologies, taking into account the available budget and a careful evaluation of the return on these investments.

**Adequate infrastructure:** To take full advantage of emerging technologies, the agency needs a solid digital infrastructure. Ensuring a fast and stable Internet connection, the capacity to store and process data, as well as the compatibility and interoperability of systems are essential aspects for the successful implementation of emerging technologies. However, providing adequate infrastructure can be a technical and logistical challenge.

**Specialized Human Resources:** The use of emerging technologies requires specialized skills and knowledge in the technological field. The agency needs to identify and employ qualified personnel capable of efficiently managing and implementing these

technologies. This may involve training and ongoing development of employees or collaborating with external experts to bring in the necessary expertise.

**Rapidity of technological evolution:** Emerging technologies evolve rapidly, and the agency must always stay aware of the latest trends and innovations to remain competitive in the market.

In addition to challenges related to costs and infrastructure, there are several external factors influencing the access and adoption of these technologies. Below, I have identified the main challenges:

**Availability and accessibility of emerging technologies in the market:** New technologies are often associated with significant costs and are sometimes only available to large and well-funded companies. In this context, Travel Agency X must carefully evaluate the possibilities of accessing emerging technologies and find appropriate solutions to improve its tourism offers and services.

**Regulations and government policy in the technology sector:** Specific regulations regarding data protection and cybersecurity may impose restrictions and additional requirements on the tourism agency concerning the use and implementation of emerging technologies.

**Competition in the tourism industry:** Tourism agencies compete to attract and retain customers, and the use of emerging technologies can be a determining factor in increasing competitiveness. The studied agency must monitor and understand competitive practices regarding emerging technologies so that it can adapt and improve its offerings to meet customer requirements and remain relevant in the market.

Despite these challenges, the company strives to adapt primarily to the needs and preferences of its customers, channeling its efforts toward identifying and integrating technologies that are genuinely useful and relevant for improving its performance. Through careful analysis of customer behavior and requirements, the agency can identify emerging technologies that are positively received and add value to the tourist experience.

Accessing European and government funds dedicated to the digitization of businesses represents a valuable opportunity for the agency to reduce expenses or even avoid them entirely. A relevant example in this regard is the "SME Digitalization Program" within the National Recovery and Resilience Plan (fonduri-structurale.ro, 2023). By obtaining funding, the company could cover the costs involved in acquiring the necessary equipment and infrastructure for implementing emerging technologies.

## V. CONCLUSIONS

Industry 4.0 and emerging technologies are particularly crucial aspects regarding the performance of enterprises in the tourism sector, significantly impacting efficiency and innovation within the business. These aspects become even more relevant in the context of the global acceleration of digitization due to the coronavirus pandemic.

Thus, we have attempted to demonstrate in this paper that understanding the theoretical dimensions of Industry 4.0 and the appropriate application of key technologies can contribute to increased competitiveness and adaptation to the new market requirements.

Tourism agencies, such as the one studied, face constant challenges in the context of a continually changing tourism reality. To maintain their performance and meet customer demands, they must adapt and leverage available opportunities in a strategic and efficient manner.

The studied agency aligns with the paradigm of Industry 4.0 through the direct or indirect adoption and application of specific technologies. The positive financial results recorded by the agency serve as compelling evidence of the effectiveness of the implemented strategies, reflecting the successful adaptation and integration of advanced technologies within the business.

By adopting software that utilizes emerging technologies, the firm has gained multiple advantages in terms of operational efficiency, innovation, and customer satisfaction.

In addition to the inherent technologies of Industry 4.0, the agency also leverages other innovations such as online booking platforms, digital marketing tools, and data analysis solutions to optimize its operations and adapt more efficiently to the needs and preferences of customers.

However, with the lifting of travel restrictions, the tourism sector continues to face various challenges. The agency is compelled to operate in an environment characterized by volatile demand, changing consumer behaviors, and growing expectations. In the post-COVID era, consumers have become more concerned about safety, health, and sustainability, influencing their choices of destinations and tourist services. Simultaneously, easy access to information and advanced technology has transformed how tourists search, book, and experience their travels.

At the end of this research, it is of particular importance to highlight two external factors that can undermine the agency's performance. These factors, with significant influences on the business environment in which the tourism agency operates, necessitate a deep analytical approach and can serve as subjects for further research.

The first factor influencing the performance of a company in the tourism sector is the level of digitization at the country level. In this context, statistical data for the year 2022 indicates that Romania

ranks last in Europe in terms of the Digital Economy and Society Index (European Commission, 2022). This ranking reflects the relatively low level of digital technology usage and digital infrastructure compared to other European countries.

Such a situation poses a disadvantage for tourism agencies in Romania, hindering access to various opportunities associated with digital transformation. For instance, limitations in connectivity and IT infrastructure can impact the ability of agencies to offer advanced digital services, such as online bookings or personalized travel experiences. Additionally, the low level of digitization may influence the relationship with customers, as they may have higher expectations regarding the use of technology and the accessibility of online services. This may require extra efforts from the travel agency to overcome these limitations and remain competitive in the market.

Another factor is the conflict in Ukraine, which may have negative consequences on the economy in general and the tourism sector in particular, especially impacting small tourism agencies like the one under study. The kerosene taxes imposed on tourists at the beginning of the conflict have already affected trust in travel agencies, which, in fact, only conveyed the conditions imposed by tour operators. Political instability and geopolitical tensions can seriously affect the desire to travel. If the military conflict at Romania's borders escalates, the tourism industry could suffer major repercussions, as follows:

**Decrease in the number of tourists:** Foreign tourists may be discouraged from visiting the region for safety reasons. This could lead to a significant decrease in the number of foreign tourists in Romania, thus affecting the revenues and performance of the tourism sector. Additionally, due to the tense situation, there is a high possibility that Romanian tourists might abandon recreational travel, choosing to move to safer areas.

**Impact on the country's image:** A military conflict near Romania's borders can influence the perception of foreigners. Tourists may express concerns about the overall security and stability of the region, potentially

leading to the avoidance of travel to Romania during the conflict.

This aspect becomes particularly significant, given the existing negative international perceptions of Romanian tourist destinations. These perceptions are related to various aspects such as infrastructure, the quality of tourist services, and the overall image of the country, according to the findings of Costea, Hapenciu, and Arionesei (2016) in an article analyzing tourism competitiveness between Romania and Bulgaria, with a focus on coastal tourism.

Thus, the negative impact on the destination's reputation becomes evident, requiring considerable marketing and promotional efforts to restore confidence in travel safety. It is essential to understand that such situations can have long-term consequences, and therefore, it is imperative to take measures to minimize the negative impact on the tourism industry.

**Disruption of transportation and travel infrastructure:** In case of an escalation of conflict and tensions in the region, transportation and travel infrastructure could be disrupted. Border closures or travel restrictions could affect the flow of tourists and could pose challenges in organizing and conducting travel to and from Romania.

It is important to note that these potential consequences depend on the evolution and scale of the conflict and how it is managed by authorities and the international community. The political and security situation in the region must be constantly monitored to assess the impact on the tourism sector in Romania and to take appropriate measures.

Therefore, this paper underscores the importance of travel agencies adapting to technological and contextual changes in the industry. The efficient use of Industry 4.0 and emerging technologies can significantly contribute to improving performance and customer experience. However, a holistic and integrated approach is necessary, encompassing both technological, contextual and geopolitical aspects, to ensure the sustainable development of the tourism industry in Romania.

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