



EVALUATING THE IMPACT OF INNOVATIVE TECHNOLOGIES ON THE MANAGEMENT OF TOUR SERVICES

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ABSTRACT

Purpose: The study aims to examine the effect of advanced technologies on tour service management in organising excursions and the overall quality of tourism services.

Design/Methodology/Approach: This research formed part of a larger study that embraced the case study research design that adopted quantitative and qualitative data. Data collection involved questionnaires completed by 137 respondents representing the tourism business sector in four European countries: Italy, France, Germany, and Ukraine. Moreover, the 23 industry experts were interviewed using an in-depth interview technique that primarily offered qualitative information. Correlation regression analysis was used to study technology usage patterns, and content analysis was used to get thematic trends and challenges.

Research Limitation: The sample size selected is adequate for preliminary findings, but the results may not be very generalisable for other categories of businesses in the tourism industry.

Findings: The study's findings established that using Virtual Reality (VR) and Artificial Intelligence (AI) significantly improved the quality of excursions. The use of IoT was also revealed to enhance the control of tourist traffic, increase the level of security, and better the utilisation of resources.

Practical Implication: The study's practical significance lies in developing recommendations to enhance excursion management efficiency, such as integrating VR-based interactive tours.

Social Implication: VR, AI, and IoT can make valuable contributions to the tourist experience and increase customer satisfaction.

Originality/ Value: This work contributes by elaborating on how excursion management can be enhanced through the application of advanced technologies, including but not limited to VR, AI, and IoT, with a particular focus on the challenges that may arise in small and medium-sized enterprises operating within the tourism sector.

Keywords: *Competitiveness. virtual reality. digitalisation. excursion. tourism*



INTRODUCTION

Excursion activities are an essential element of the tourism industry, which is expanding and modernising every year thanks to the introduction of innovative technologies. Under the conditions of global digitalisation, it is required to apply the newest technological tools to guarantee excursion quality and attract tourists to increase travel companies' competitiveness. Nonetheless, despite the progressive increase in the utilisation of such technologies in automating operational tasks, it is not easy to apply such technologies to operating models and business processes due to technical constraints and limitations as well as financial constraints, particularly to tiny and medium-sized enterprises.

The research conducted and reviewed in exposing this paper reveals that current emergent technologies and innovations, including Virtual Reality, Artificial Intelligence and the Internet of Things, have been incorporated as critical strategies in providing better tourist services globally. Thus, in a work by Al-Said et al. (2024), VR is used in training managers of travel companies and in developing new experiences for tourists, which in turn helps to enhance their interest. Other works, for instance, by Godovykh et al. (2022), describe the benefits of applying AI in managing tourist routes so that the offered services are more tailored to the customers.

Nonetheless, regarding developing this kind of cooperation, several white spots should be the object of further studies. First, many business entities are reluctant to adopt new technologies because they are costly and require skilled personnel to implement them in business entities. Secondly, there are still many concerns about the further technological effects on the process of excursion and tourist flow organisation.

This paper aims to evaluate the effectiveness of new technologies in improving the efficiency of excursions and the quality of tourist services and make recommendations on how these technologies could enhance the efficiency of excursion management.

THEORIES UNDERPINNING THE STUDY

Advanced technologies play valuable roles in the growth of the tourism sector, including using virtual reality for training managers for travel companies (Beck et al., 2019; Bayev et al., 2022; Al-Said et al., 2024) or for creating virtual tours to promote tourism services (Godovykh et al., 2022; Kvita & Kurnyavkin, 2019). Other researchers also highlight the urgency of using digital tools to enhance the tourism competitiveness of regions (Byelikova et al., 2024; Niziaieva et al., 2022). Applying advanced technologies, including Artificial Intelligence and the Internet of Things, it is possible to enhance the availability and quality of tourism services and to maintain the tourism sector's climate resilience during the Covid-19 pandemic (Lanfranco, 2022; Lew et al., 2022; Lu et al., 2022; Novera et al., 2022; Kompanets et al., 2023). Ticketing applications in tourist villages efficiently enhance the tourism sector's growth, particularly the digitisation issue (Hartatik et al., 2022).



The augmented interest in scholarly works on technological innovation in tourism, especially in the Asian context, examines the issues and opportunities of implementing new technologies in the tourism market (Meo et al., 2022; Liutikas, 2023; Batsurovska et al., 2024). A critical element of new tourism is video marketing and the creation of emotional involvement of consumers (Yung et al., 2021; Kim et al., 2020; Rauscher, 2020; Batsurovska & Melnychenko, 2024).

Furthermore, incorporating digital technologies aids in the recovery of tourism after the pandemic by increasing the quality of the delivered tourism services and the given tourist experience (Panchenko et al., 2023; Liutikas, 2023). However, it has been found that the state is also crucial for financing cultural and artistic tourism and initiatives for the projects' support to contribute to sustainable development in globalisation (Byrkovych et al., 2023; Saienko et al., 2020). This also reveals that tourism development, which focuses on digital marketing and information technology, enables coastal areas to sustain their competitiveness (Petryanina, 2021; Byelikova et al., 2024).

In addition to the aspects already mentioned, research on the transformation of the tourist experience after the pandemic, in particular on the potential of virtual tourism as a tool for industry recovery, plays a vital role in the development of modern tourism (Lu et al., 2022; Liutikas, 2023). Information and digital tools in tourism also serve as a basis for ensuring business security and increasing the competitiveness of regions (Byelikova et al., 2024; Meo et al., 2022).

The study of the impact of digital technologies on the tourism sector includes not only business security but also improving the quality of management of tourism companies through new technological platforms, as in the case of the ATLAS platform (Al-Said et al., 2024; Kompanets et al., 2023). In today's digitalised world, the emphasis is shifting to using intelligent technologies to optimise the performance of tourism enterprises (Hartatik et al., 2022; Godovykh et al., 2022). Thus, innovative technologies, including virtual reality, digital marketing tools and artificial intelligence, are changing approaches to managing tourism enterprises and contributing to their competitiveness in the global market (Novera et al., 2022; Kvasnii et al., 2023).

Other innovative tourism approaches also entail utilising artificial reality and IoT technologies, which help streamline tourist routes and branding during the periods of the pandemic (Byrkovych et al., 2023; Kastanidou, 2019). The literature analysis revealed that managing digital organisational business processes creates value that enables companies in the tourism sector to stay relevant during the crisis period (Oliynyk et al., 2021; Panchenko et al., 2023). It should be pointed out that government funds for cultural activities help maintain a stable tourism market in conditions of globalisation (Byrkovych et al., 2023; Saienko et al., 2020). Furthermore, the findings also reveal that managing the security of travel companies through



information and communication systems remains an essential factor when dealing with today's threats (Niziaieva et al., 2022; Meo et al., 2022). Therefore, aided by modern techniques, including AI and virtual reality, the management and marketing of tourism services are much more effective, helping to advance the sustainable tourism industry (Godovykh et al., 2022; Liutikas, 2023).

METHODOLOGY

Research Design

This research formed part of a larger study that embraced the case study research design that adopted quantitative and qualitative data.

Sampling Technique and Sample Size

Purposive sampling was adopted for this study. The study was conducted in 2021-2023 in four European countries: Italy (Rome, Milan), France (Paris, Nice), Germany (Berlin, Munich), and Ukraine (Kyiv, Lviv). The sample included 137 respondents representing various segments of the travel industry: 57 managers of travel companies, 44 tour guides and 36 IT specialists in the tourism sector.

Research Instrument

The primary method of collecting quantitative data was a questionnaire conducted among tourism business representatives from different regions. The questionnaire included questions about using the latest technologies (VR, AI, IoT), their impact on the quality of tourism services, and the obstacles companies face in implementing these technologies (Appendix A). The survey used online surveys via specialised platforms and personal meetings with respondents.

Twenty-three interviews were conducted with experts in the sightseeing field to obtain in-depth qualitative data. Among them were representatives of well-known companies such as TUI Group, Thomas Cook, ItaloTour, and VisitBerlin. The interviews focused on identifying the practical aspects of implementing innovative solutions in companies' day-to-day operations and the key challenges that arise during their integration.

Data Analysis

In addition to the primary data, we analysed secondary sources, such as academic articles, reports and studies that highlight the impact of innovative technologies on the tourism industry. Particular attention was paid to studies on using virtual reality to attract tourists, artificial intelligence to personalise services, and the Internet of Things to automate tourism processes. This review helped to understand the general trend of technology adoption in the tourism sector at the global level.



After the data collection, the questionnaire responses were summarised and classified into the main areas of technology adoption. The interviews' results complemented the quantitative data by providing practical examples of technology implementation in travel companies. This allowed us to understand better the natural state and challenges of using the latest solutions in different countries.

Through quantitative and qualitative research methods, it was possible to understand the impact of innovative technologies on excursion activities and determine how these technologies contribute to improving the quality of tourism services and the competitiveness of tourism companies.

RESULTS AND DISCUSSION

The leading innovative technologies used in excursion activities include the following innovative technologies.

Virtual Reality (VR). This technology allows for creating virtual tours that can be used to promote tourism products. Virtual tours provide an immersive travel experience, allowing potential tourists to visit places virtually before they decide to visit them physically. Studies show that VR in tourism marketing promotes consumers' emotional engagement and increases purchase intentions.

Artificial intelligence (AI) is used to personalise travel offers, analyse large amounts of data, and improve the management of travel businesses. For example, AI can optimise the work of travel companies through intelligent platforms such as ATLAS, which help manage travel routes and brands.

Internet of Things (IoT): IoT enables the integration of various devices to automate processes and create innovative travel services. These can include ticket management through mobile applications, monitoring tourist flows, and ensuring tourist safety.

Digital marketing tools. They allow travel companies to use social media and other online platforms to promote their services and attract new customers. Mobile application technologies for travel management are particularly effective, as they greatly simplify the booking and travel planning process.

Smart technologies. The use of smart devices and platforms to optimise the operation of tourism businesses is becoming a significant trend in the sector. Intelligent technologies can automate many processes, increasing companies' efficiency and competitiveness.

Such innovative technologies improve the quality of travel services and help travel companies remain competitive in the context of globalisation and the industry's post-pandemic recovery.



Virtual reality, artificial intelligence, and digital marketing tools increase the efficiency of travel companies' management and improve customer experience. Using new technologies makes it possible to save money and time in travel companies and become closer to ideal when organising excursions. Table 1 shows the impact of innovative technologies on excursion activities.

Table 1: Impact of Innovative Technologies on Sightseeing Activities

Technology	Impact on sightseeing activities	Application examples
Virtual reality (VR)	Provides virtual tours that allow for visiting places	Virtual tours for advertising tourism products
Artificial intelligence (AI)	Optimising management, personalising offers	ATLAS platform for managing tourist routes
Internet of Things (IoT)	Automating processes, improving security	Mobile applications for ticket management, flow monitoring
Digital marketing tools	Increased customer engagement, effective advertising	Using social media to promote excursions
Smart technologies	Automating processes, increasing competitiveness	Smart devices for travel management and control

We conducted a study covering 2021 to 2023 on the impact of the latest technologies on the organisation of excursion activities. The study aimed to assess the impact of innovative technologies on excursion organisation's efficiency and the quality of services provided.

The questionnaire data were analysed using quantitative methods (correlation and regression analysis). The interviews were processed using content analysis to identify key trends and barriers to introducing new technologies in the tourism sector. Figure 1 shows the study's results on using new technologies in the tourism sector (2021-2023).

Between 2021 and 2023, there has been a steady increase in the use of new technologies such as virtual reality (VR), artificial intelligence (AI) and the Internet of Things (IoT) in the tourism industry. The utilisation of VR increased to 9.3 % over three years; this shows the increase in our society's need for virtual tours to draw tourists amid the pandemic. Artificial intelligence (AI) is gaining popularity, which can be seen in the increase from 18.74% in 2021 to 25.34% in 2023. The share of respondents who do not use technology has almost halved from 15.29% in 2021 to 9.34% in 2023, indicating the gradual digitalisation of the tourism business.

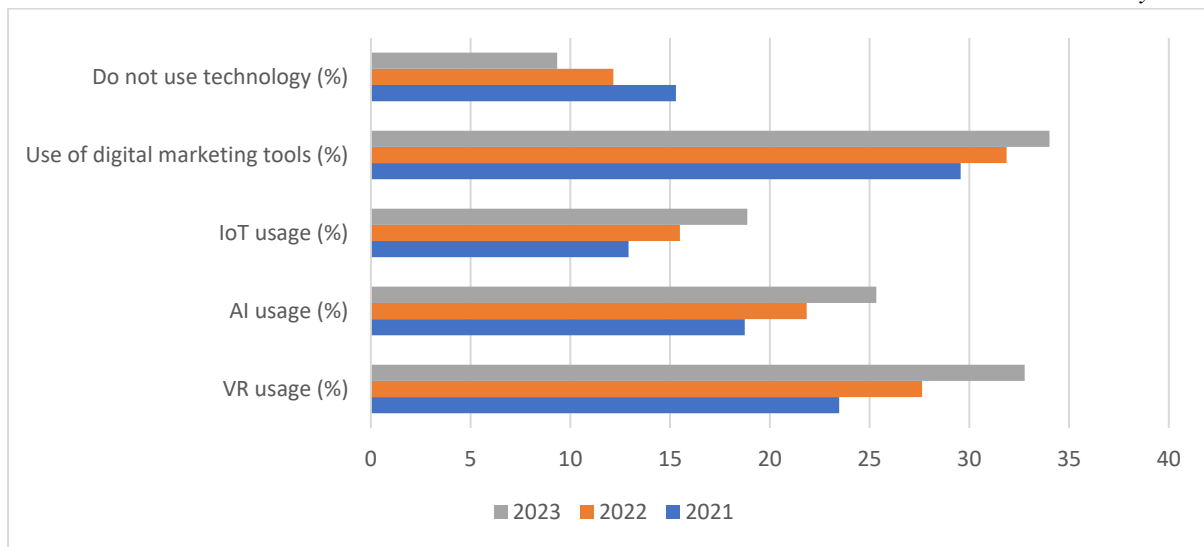


Figure 1: Dynamics of Introducing the Latest Technologies in the Tourism Sector (2021-2023)

In 2021-2023, the dynamics of using the latest technologies in tourism activities demonstrated steady growth. The use of virtual reality (VR) increased from 23.48% in 2021 to 32.78% in 2023, which shows a higher percentage for virtual tours due to the pandemic period for travelling and post-pandemic tourism. AI, like Big data, grew from 18.74% to 25.34% within three years. This 6.6% increase is due to the development of individual selling of travel services and the usage of technologies in the management of travel companies. Internet of Things (IoT) also revealed growth rates, which have grown from 12.92% in 2021 to 18.87% in 2023. A five-point ninety-five per cent increase reveals a desire to automate and control tourist traffic to enhance the security and quality of services and products. The portion of digital marketing tools also rose – from 29.57% to 34.02%. This can result from the available online techniques to market tourism products and the applied social media Customer Acquisition strategies. Last, the percentage of respondents with no digital technology has reduced from 15.29% to 9.34 %, showing that the travel sector business is now entirely digitised.

Discussion

According to the paper's results, innovative technologies have influenced excursion activities positively, as it is detected that traditional and current technologies, including VR, AI, and IoT, have been adopted increasingly. Our conclusions are recognised by the study of Godovykh et al. (2022), which has underlined that VR can strategically engage tourists and enhance customer experience. However, in contrast to Beck et al. (2019), pointing at certain limitations of VR in creating at least some realistic perspective of the tourism process, our study reveals the constant growth of VR usage as the practical means for compensation for physical inability to travel to the tourism facilities. Regarding the use of AI, our results support the idea proposed



by Al-Said et al. (2024), emphasising the efficiency of artificial intelligence in arranging tourist routes and relating the services. However, it is also essential to understand that according to Rauscher (2020), such an introduction may reduce the human factor in the tourism sphere, which is quite adverse for the customer. Our evidence partly supports this view; some respondents mentioned that personalised services may not always be satisfactory.

The IoT is still actively involved in the automation of various processes, which is entirely consistent with the view of Novera et al. (2022), who noted the valuable role of this technology in the security and monitoring of tourist visits. However, this research also observed that while there is an increased uptake of the IoT, several implementation constraints and high costs of using IoT technology restrict this technology within small companies. The results confirm our assumption that new technologies improve the quality of excursion activities and enhance travel companies' competitiveness. Nonetheless, the current study only provided a baby step towards revealing the consequences of innovative solutions for the sector as it requires more investigation on other aspects of the application of technologies like AI and IoT on tourism in the long term and customer security.

This work was conducted in several European countries to be generalised only to a few European countries. It would also be appropriate to state that a country's and companies' propensity to adopt technology in tourism mainly depends on their state and financial capacities.

CONCLUSION

The paper's results indicate the necessity of introducing advanced technologies to enhance the quality of excursion-based tasks. The application of virtual reality, artificial intelligence and the Internet of Things helps enhance the tourist experience and offers excellent potential for attaining optimal outcomes by managing tour operators.

However, the results show that introducing technologies has limitations, such as high IoT implementation costs and insufficient technical staff training. One of the study's new findings is that VR has become a tool for attracting tourists and compensating for the limitations of physical travel, which is especially important in the post-pandemic period. This aspect has not been sufficiently covered in previous studies, which makes our results novel. Although the introduction of AI is actively supported by large companies, small travel businesses still face difficulties in personalising services due to limited resources, which suggests the need for further research in this area.

This study points to the importance of creating affordable solutions for small and medium-sized enterprises, which will allow for the expansion of innovative technologies in the broader market segment.



The study's practical significance lies in the fact that the results obtained can be used to develop recommendations for improving travel companies' competitiveness through innovative solutions. At the same time, the study has shown that the effective use of technology requires financial support and the development of employees' digital competencies.

Recommendation

These are recommendations for improving the quality of excursion activities through innovative solutions:

1. *VR is a new technology in company operations.* This will aid in developing virtual tours that give tourists a sneak preview of the sites. This will assist in customer attraction and enhance their concern for tour-related Services.
2. *Artificial intelligence will be added to service delivery to suit the individual client.* AI will help collect automated data about tourist interests and provide special routes to increase consumer satisfaction.
3. *Application of the Internet of Things (IoT).* Using IoT technologies to manage excursion routes will ensure the monitoring of tourist flows and promote better organisation and safety measures during excursions.
4. *Active usage of digital marketing tools.* Successful excursion advertising is possible by advertising and marketing excursion services through social media networks and the Internet.
5. *Mobile applications for trip arrangements.* Mobile apps where tourists can book tours, receive the necessary information, and control the service schedule will enhance service convenience and customer satisfaction.

Further research should focus on assessing the long-term impact of technology on the tourism industry, including the social and economic aspects of its adoption. It is also essential to examine how innovative solutions can help overcome crises, such as pandemics or economic recessions, and ensure the sustainable development of the tourism sector.

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