

Smart tourism in Dubai: Exploring ICT, RAISA, and government's role in economic and technological advancements



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Abstract Dubai has established itself as a global leader in tourism by integrating advanced technologies to enhance visitor experiences and operational efficiencies. This study examines the impact of Information Communication Technology (ICT), Robotics, Artificial Intelligence, and Service Automation (RAISA) on Dubai's tourism sector, focusing on their role in driving innovation, assessing economic benefits, and evaluating the government's contributions to fostering and regulating technological integration. A structured survey was conducted with 316 participants, and data were analyzed using descriptive statistics, correlation analysis, and Structural Equation Modelling (SEM). The findings highlight strong interconnections between ICT, RAISA, and economic benefits, demonstrating their combined influence in shaping technological advancements in tourism. ICT emerged as a key enabler, significantly impacting innovation and economic outcomes, while RAISA contributed to operational efficiency and enhanced customer satisfaction. The government played a crucial role in providing regulatory frameworks and infrastructure for sustainable technology adoption. The results underscore the transformative power of smart tourism initiatives in maintaining Dubai's competitive edge as a premier global destination. Policymakers are encouraged to prioritize ICT investments, foster innovation funding, and enhance workforce training programs to optimize technological advancements. Industry stakeholders must align business strategies with emerging visitor expectations, integrating advanced digital solutions to improve efficiency and overall customer experience. By bridging gaps in existing research, this study offers a comprehensive framework for leveraging smart tourism practices to drive sustainable growth. It provides insights into how technology-driven innovation can enhance tourism experiences, economic development, and long-term competitiveness. With continued investment and policy support, Dubai is poised to set new global benchmarks in smart tourism, ensuring its leadership in the digital era.

Keywords: smart tourism, ICT in tourism, Robotics in tourism, service automation, technological innovation, tourism economy

1. Introduction

Dubai has established itself as a pioneer in the global tourism industry by embracing cutting-edge technologies and forward-thinking policies. A significant portion of the city's remarkable success in tourism can be attributed to its proactive approach to leveraging technological advancements to enhance visitor experiences and operational efficiency. This strategy has firmly positioned Dubai as a premier destination for leisure and business travellers, reinforcing its global reputation as a hub for innovative tourism.

Information and Communication Technology (ICT) and Robotics, Artificial Intelligence, and Service Automation (RAISA) are central to this transformation. These technologies have revolutionized traditional tourism practices, creating a tech-driven intelligent ecosystem that meets the evolving needs of modern travellers. By integrating ICT and RAISA, Dubai has redefined service delivery, visitor engagement, and operational management, setting a benchmark for global destinations to emulate (Sharma & Aggarwal, 2024).

Despite Dubai's notable accomplishments in smart tourism, the current literature lacks thorough insights into how the amalgamation of ICT, RAISA, and proactive governmental policies collectively propels technological and economic progress. This paper addresses this gap by providing an empirical examination of these interrelated aspects in Dubai's tourism sector.

1.1. ICT's Function in the Tourism Industry

This report emphasizes how important ICT is to Indonesia's tourism sector and economic expansion. ICT has enhanced tourism experiences and regional economic performance by improving digital services, internet accessibility, and smart hotel



operations. Growth has been greatly aided by elements such as government spending, international investment, star hotel occupancy, and broadband availability. The experience of Indonesia shows how incorporating ICT into tourism may boost industrial competitiveness internationally, draw tourists, and spur economic development (Audina et al., 2024).

Mobile applications, for instance, have evolved into vital tools for tourists visiting Dubai. These programs provide a variety of features, including real-time navigation, event information, and exclusive deals. In a similar vein, augmented reality technologies enable tourists to discover cultural landmarks, historical sites, and entertainment venues in unique ways, thereby enhancing their comprehension and appreciation of the city's attractions. Furthermore, digital payment technologies allow frictionless financial transactions, appealing to the global audience that Dubai attracts (Sigala, 2018).

1.2. Influence of RAISA on Tourism

RAISA technologies have taken service delivery to levels that have never been seen before, while information and communications technology has laid the groundwork for connectivity and convenience. Using chatbots, robotic assistants, and automated platforms that are powered by artificial intelligence, Dubai's tourism industry has transformed its operational landscape (Lu et al., 2019)

For example, chatbots powered by artificial intelligence are being utilized extensively in hotels, airports, and tourism information centres all over Dubai. Customer service is provided by these chatbots around the clock, seven days a week, and they can answer questions, make suggestions, and efficiently resolve problems. When deployed in hospitality settings, robotic assistants can perform a wide variety of tasks, including room delivery and concierge services, ensuring that customers receive prompt and accurate service (Wirtz et al., 2018; Tung & Au, 2018). Automated platforms, including self-check-in kiosks and virtual tour guides, empower visitors to access services independently, minimizing wait times and enhancing overall convenience.

The impact of RAISA extends beyond the optimization of operational efficiency and encompasses personalization as well. Algorithms powered by artificial intelligence examine the preferences and actions of visitors in order to provide individualized recommendations. This helps to ensure that each traveller's experience is personalized to their own interests. This level of customization not only boosts client happiness but also builds brand loyalty, adding to the long-term success of Dubai's tourism firms (Leung, 2022).

1.3. Economic Implications of Technology in Tourism

RAISA and the adoption of information and communication technology in Dubai's tourism industry will have significant economic repercussions. By maximizing the use of available resources and simplifying corporate processes, these technologies have greatly contributed to an increase in the profitability of companies. In addition, the incorporation of developing technologies has resulted in the creation of new job opportunities, notably in tech-driven positions such as research and development of artificial intelligence, digital marketing, and data analysis. Dubai's economic growth has been bolstered as a result of the twin impact of cost reduction and job creation, which has strengthened Dubai's position as a competitive global tourism hub (Sigala, 2018; Leung, 2022).

Additionally, the implementation of smart tourism technology has made it possible for Dubai to attract high-value tourists, all of whom make a more significant contribution to the economy of the local area. Dubai has successfully targeted wealthy tourists who are looking for luxury, convenience, and innovation by providing premium experiences that are improved by technology. It is not only the generating of money that is driven by this strategic focus on high-value tourism, but it also helps to promote the development of ancillary businesses such as retail, entertainment, and transportation (Choi et al., 2021).

1.4. Government's Role in Technological Advancement

Equally instrumental in Dubai's tourism success is the role of the government in fostering technological advancements. A strong framework for innovation has been established by the government through initiatives such as Smart Dubai. This framework emphasizes the development of infrastructure, the protection of data, and environmentally responsible practices. By taking such a comprehensive approach, Dubai can ensure that the adoption of technological advancements is in line with its long-term tourism growth strategies (Smart Dubai, 2021; Hall et al., 2019).

Policies supporting innovation funding, workforce training, and public-private partnerships have been particularly impactful. With the help of incentives for private sector investments in information and communication technology (ICT) and RAISA, the government has sped up the process of implementing new technologies throughout the tourism industry. Workforce training programs, meanwhile, ensure that employees are equipped with the skills needed to operate and manage these technologies effectively. This concentration on the development of human capital is necessary to sustain technological innovation and to keep service excellence at a high level (Dredge, 2018).

In addition to this, the government's dedication to environmentally responsible tourism practices is another important aspect of its role. Through the promotion of sustainable initiatives and the prioritization of environmentally friendly technologies, Dubai has demonstrated its commitment to reducing the negative effects that tourism has on the environment.

This proactive approach not only boosts Dubai's attractiveness to environmentally concerned guests but also coincides with worldwide sustainability goals (Gössling & Hall, 2019; Dubai Tourism, 2020).

1.5. Research Objectives and Contributions

This study aims to comprehensively analyze the role of ICT, RAISA, and government interventions in driving innovation and economic benefits within Dubai's tourism industry. By addressing these objectives, the research provides actionable insights for policymakers, industry stakeholders, and researchers. It highlights the transformative potential of technology and governance in shaping the future of tourism, offering a roadmap for sustaining Dubai's competitive edge in an increasingly digitalized global landscape.

In the process of contributing to the larger conversation about smart tourism, this study highlights the significance of collaborative efforts between technology and governance. The travel and tourism experience has been reimagined as a result of Dubai's strategic integration of information and communication technology (ICT) and RAISA, which has been supported by innovative policies. These findings serve as a great reference for other destinations wanting to harness the power of technology to better their tourism economies. The purpose of this research is to provide a comprehensive understanding of the factors that contribute to Dubai's tourism industry's success by analysing the dynamic relationship that exists between innovation and governance. It presents a plan for harnessing technology to develop sustainable, inclusive, and economically advantageous tourism ecosystems in the digital era.

1.6. Roadmap

The article is organized in the following manner: Section 2 offers a comprehensive examination of the current literature about ICT, RAISA, and governmental initiatives in the tourism sector. Section 3 delineates the process, encompassing data collecting and analytical techniques. Section 4 presents the results, while Section 5 delineates practical and theoretical consequences. Ultimately, Section 6 ends the study and proposes avenues for future research.

2. Literature Review

For a full grasp of the ways in which developing technology and governance frameworks impact the tourism industry, the literature on smart tourism gives a comprehensive insight. In this section, we will discuss the contributions that Information and Communication Technology (ICT), Robotics, Artificial Intelligence, and Service Automation (RAISA) have made, as well as the role that government interventions have played in fostering technological innovation and economic growth within the tourism industry.

2.1. ICT and Tourism Innovation

This study explores the role of ICT in enhancing the competitiveness of travel agencies (TAs) in Dubai. It highlights how TAs use the Internet for service customization, customer engagement, and global market access, benefiting from increased sales, reputation, and competitive advantage. However, barriers such as high costs, security concerns, and a lack of skilled IT labour hinder e-commerce adoption. The study emphasizes the need for government support, training, and affordable e-commerce solutions to drive digital transformation in Dubai's tourism sector (Zaidan, 2017).

It has been thoroughly documented that information and communication technology plays a role in the transformation of tourism. Because it enables seamless connection, the sharing of information in real time, and operational efficiency, information and communication technology is an essential component of contemporary tourism plans. To create more individualized travel experiences, many research highlight the revolutionary power of information and communication technology. Mobile applications, augmented reality (AR), and digital payment systems make it possible for tourists to access information, book services, and interact with places in a convenient manner. These technological advancements make a substantial contribution to improving both the enjoyment of visitors and the performance of operations (Höpken et al., 2019).

The way in which tourists connect with their destinations has been fundamentally altered by mobile technologies in particular. According to the researchers, location-based services that are incorporated into mobile applications give tourists the ability to explore destinations in real time, receive recommendations that are personally suited to their interests, and have access to unique discounts. Augmented reality applications enhance cultural and historical experiences by superimposing digital content onto physical locations, so adding a dimension of immersion. Research highlights that digital payment systems, which include mobile wallets and contactless payments, guarantee the smooth transactions of financial transactions, thereby satisfying the expectations of a worldwide audience that is well-versed in technology (Del Chiappa & Baggio, 2020).

ICT's role extends beyond the convenience it provides to individuals and includes the impact it has on the management of destinations. According to Sigala (2018), information and communication technology makes it possible to make decisions based on data by collecting and evaluating data about visitors. This provides insights into visitor behaviour, preferences, and trends. Using this information, destination marketing organizations can more effectively plan focused campaigns and optimize budget allocation, both of which are extremely valuable strategies.

2.2. RAISA Technologies and Operational Efficiency

Through the automation of mundane operations and the improvement of contacts with customers, RAISA technologies have brought about a revolution in the supply of services within the tourism industry. According to Ivanov and Webster (2019), RAISA technology can be broken down into three key categories: robotics, artificial intelligence (AI), and service automation. The simplification of operations, the improvement of service quality, and the reduction of costs are all significantly impacted by each separate area (Ivanov & Webster, 2019).

Robotics has found uses in a variety of tourism-related fields, including the hospitality industry, transportation, and the entertainment industry. Service delivery that is both consistent and efficient can be provided by robotic assistants, such as the concierge robots seen in hotels and the automated kiosks found in airports. These innovations reduce the likelihood of errors caused by humans and guarantee rapid solutions to the requirements of customers (Trimi, 2020). For instance, robotic room service systems in luxury hotels improve convenience while simultaneously lowering the amount of money spent on labour.

Tools that are powered by artificial intelligence, such as chatbots and virtual assistants, have revolutionized customer service. To provide individualized recommendations, responding to inquiries, and resolving issues, artificial intelligence systems process large volumes of data. This degree of personalization increases the amount of satisfaction experienced by customers and helps to cultivate loyalty (Kim et al., 2020). Additionally, service automation technologies, such as self-check-in kiosks and digital concierge systems, give passengers the ability to access services on their own, thereby minimizing the amount of time they have to wait and enhancing the efficiency of operations.

By maximizing the exploitation of available resources, RAISA technologies also contribute to the concept of sustainability. Automated energy management systems, for example, are used in hotels to monitor and regulate energy consumption depending on occupancy patterns. This helps to reduce waste and promote environmentally friendly behaviors. These improvements are in line with the increased need for environmentally responsible tourism solutions (Rhou & Singal, 2020).

2.3. Economic Implications of Smart Tourism

Recent research has focused a lot of attention on the economic impact that technologies like RAISA and ICT have had on the tourism industry. It is emphasized by Sigala (2018) that the implementation of these technologies results in cost efficiency, enhances profitability and contributes to the development of available jobs. Automating mundane processes allows organizations to more efficiently spend their resources, allowing them to concentrate on activities that add value and improve the quality of their interactions with customers (Law et al., 2020).

As Dubai moves toward a knowledge-based economy under programs like Smart Dubai and The Abu Dhabi Economic Vision 2030, this study emphasizes the financial impact of smart tourism in the city. It highlights how innovation, digitization, and ICT improve tourist services, visitor experiences, and economic diversification. Predictive and prescriptive analytics are also included in the report as ways to improve smart city infrastructure, increase tourism-related income, and make Dubai more competitive internationally. Nonetheless, obstacles, including performance management frameworks and implementation barriers, are identified as crucial factors for maintaining growth (El Khatib et al., 2023).

Smart tourism technology helps to attract high-value tourists in addition to generating income. Affluent tourists seek experiences that are customized, technologically advanced, and warrant higher-than-average costs. Locations that invest in state-of-the-art technology present themselves as desirable options for affluent tourists. The adoption of smart tourist practices also helps to diversify the economy by encouraging innovation in ancillary industries such as shopping, entertainment, and transportation (Chang et al., 2019).

2.4. The Role of Government in Smart Tourism

To a large extent, governments are responsible for supporting the acceptance of technology advancements within the tourism industry. The Smart Dubai program is a prime example of how public policy can be used to stimulate innovation and encourage sustainable practices. A comprehensive framework for smart tourism has been established as a result of the government's emphasis on data security, infrastructure growth, and environmentally friendly practices (Smart Dubai, 2021; Gössling et al., 2019).

There has been a significant acceleration in the adoption of RAISA and information and communication technology (ICT) technologies thanks to policies that foster innovation financing and public-private partnerships. Through the provision of financial incentives to private sector investments, governments make it possible for enterprises to adopt cutting-edge tools that improve their competitiveness. Workforce training programs further ensure that personnel can properly manage and operate these technologies, bridging skill gaps and promoting long-term innovation. Workforce training programs further ensure that long-term innovation is supported.

Furthermore, the government's emphasis on environmentally responsible tourism practices is in line with international initiatives to reduce the negative effects that tourism has on the environment. It is possible to demonstrate a commitment to sustainability by the implementation of initiatives that promote green technologies, such as renewable energy systems and

environmentally friendly transportation. By taking these actions, a place can increase its appeal to travelers who are concerned about the environment while also contributing to the achievement of global sustainability goals (Gössling & Hall, 2019)

2.5. Integration of ICT, RAISA, and Governance

The Hospitality & Tourism (HT) Industry 4.0 is being revolutionized by the combination of ICT and RAISA (Robotics, Artificial Intelligence & Service Automation), which is increasing digital accessibility and improving service effectiveness. With a 20% growth predicted as a result of widespread tech adoption, automated booking systems, data-driven customization, and international digital marketing have greatly increased tourism transactions. The report identifies several significant obstacles, such as data privacy hazards, overtourism, pricing competitiveness, gentrification, sustainability issues, and employment displacement, even though these advances enhance accessibility and visitor experiences. The long-term viability of the tourist sector depends on striking a balance between ethical and sustainable tourism practices and technical improvements (George and Mishra, 2024).

The interplay of governance frameworks, RAISA, and information and communication technology (ICT) forms the basis of smart tourism. According to certain studies, cooperation amongst numerous stakeholders is necessary for integration to be successful. Governmental organizations, IT companies, and travel industry experts are some of these stakeholders. Technical advancements are brought into line with visitor needs and operational objectives by employing this cooperative approach.

Destinations such as Dubai are now able to provide seamless, tailored experiences that appeal to a wide variety of traveler profiles because of the combination of information and communication technology (ICT) and RAISA technologies. At the same time, interventions from the government make certain that these innovations are implemented responsibly, addressing concerns such as the adaptability of the workforce, data protection, and cybersecurity. Destinations can achieve sustainable growth and keep their competitive advantage in the global tourist scene if they cultivate a link between technology and governance that is synergistic (Del Vecchio et al., 2018).

2.6. Government's Role in Technological Advancements

Two of the most significant responsibilities that governments play in the process of creating the technological landscape of the tourism industry are the supply of regulatory frameworks and assistance for infrastructure development. Through the execution of programs like the Smart Dubai Strategy, Dubai has established a strong foundation for the integration of cutting-edge technologies across a range of industries, including tourism (Smart Dubai, 2021). Policies that give financing for innovation, employee training, and data security top priority are crucial for fostering an environment that is conducive to the adoption of new technology (Sigala, 2018).

Partnerships between the public sector and the commercial sector generate collaborative innovation, which further amplifies the impact of government efforts. As an illustration, Dubai's tourism officials collaborate closely with technology companies in order to build smart city solutions that improve the experiences of tourists. In addition, the policies that place an emphasis on the ethical usage of artificial intelligence and data protection help to develop confidence among stakeholders, which in turn ensures the responsible adoption of emerging technologies (Baggio & Del Chiappa, 2020).

It is clear that the government is dedicated to maintaining Dubai's competitive advantage in the global tourism industry, as seen by its active participation in fostering digital literacy and granting incentives for technical investments. Dubai serves as a model for how the government may serve as a catalyst for innovation and economic success within the tourism sector. This is demonstrated by the city's ability to integrate economic policies with technological advancements.

3. Methodology

This research utilized a systematic approach to examine the effects of technological innovations on Dubai's tourism sector. Data were gathered from 316 participants through a comprehensive survey instrument aimed at capturing perceptions and experiences concerning ICT, RAISA, Technological Innovation, Economic Benefit, and the Government's Role. The survey included both closed-ended and Likert-scale questions to guarantee thorough data collection across all dimensions of the study's aims.

The data were examined employing sophisticated statistical methods to derive significant insights. Descriptive statistics summarized participant responses, emphasizing trends and distributions within the dataset. Correlation analysis was performed to investigate the links among the principal constructs, providing an initial comprehension of their interdependencies. Structural Equation Modeling (SEM) was utilized through AMOS 26 to analyze causal links and evaluate the theoretical framework posited in the study. SEM facilitated the concurrent examination of several factors, yielding a comprehensive understanding of the direct and indirect impacts of ICT and RAISA on economic advantages and technical innovation.

The technique guaranteed the reliability and validity of the findings through stringent data gathering and analysis protocols. This thorough methodology not only aligns with the study's goals but also provides practical information for

stakeholders in the tourism industry. The study integrates quantitative analysis with theoretical exploration to offer a comprehensive grasp of technology's revolutionary potential in Dubai's tourism sector.

4. Results and Discussion

4.1. Descriptive Statistics

The descriptive statistics summarize essential data points across the constructs analyzed in the study, including Technological Innovation, ICT, RAISA, Economic Benefit, and Government's Role. The average values demonstrate strong participant consensus regarding the importance of these characteristics in influencing Dubai's tourism environment. The Government's Role achieved the highest mean (39.06), indicating its crucial role in promoting technical developments (Table 1). Likewise, Economic Benefit and ICT exhibited robust mean scores, underscoring their significant impact on organizational efficiencies and consumer pleasure.

Table 1 Distribution of Participant Responses (Description: Table showing frequency distributions for each construct).

Construct	Mean	Std. Deviation	N
Technological Innovation	31.60	3.455	316
ICT	31.83	3.260	316
RAISA	31.43	3.909	316
Economic Benefit	31.91	3.201	316
Govt. of Dubai	39.06	4.150	316

4.2. Correlation Analysis

The correlation analysis elucidates the relationships among the study's principal constructs. Significant positive relationships were discovered among ICT, RAISA, and Economic Benefit, demonstrating their interconnectedness in fostering innovation and operational efficiency. For example, ICT had a substantial association with Technological Innovation ($r = 0.843$, $p < 0.01$), highlighting its function as a fundamental facilitator of smart tourism projects (Table 2). RAISA exhibited significant correlations with both Technological Innovation and Economic Benefit, highlighting its revolutionary influence on customer experiences and service automation. These findings provide empirical support for the interconnected nature of technological advancements in Dubai's tourism sector.

The correlation matrix highlights significant positive relationships among key constructs:

Table 2 Correlation Matrix (Description: ICT and Economic Benefit show the strongest relationship, underscoring the critical role of ICT in driving economic outcomes).

Variable	ICT	RAISA	Economic Benefit	Govt. of Dubai
Technological Innovation	0.843**	0.844**	0.826**	0.662**
ICT	-	0.860**	0.889**	0.679**
RAISA	-	-	0.869**	0.660**
Economic Benefit	-	-	-	0.677**

4.3. Structural Equation Modeling (SEM)

The SEM model illustrates the relationships among ICT, RAISA, Technological Innovation, and Economic Benefits (Figure 1):

- ICT → Technological Innovation: Path coefficient = 0.710
- RAISA → Technological Innovation: Path coefficient = 0.320
- Technological Innovation → Economic Benefit: Path coefficient = 0.971

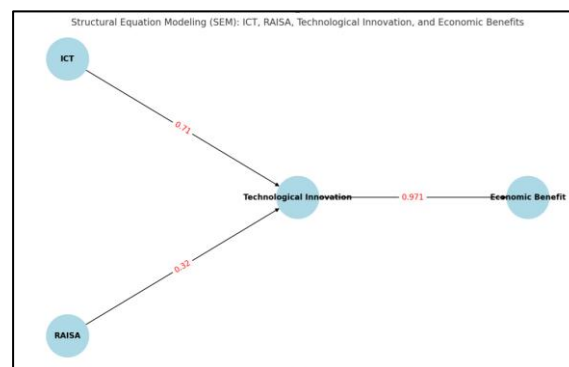


Figure 1 SEM Path Diagram.

The diagram illustrates the Structural Equation Modeling (SEM) relationships among ICT, RAISA, Technological Innovation, and Economic Benefits. The path coefficients between the variables are displayed along the directed edges.

4.4. Analytical Discussion

The results indicate a notable positive correlation among ICT, RAISA, and Economic Benefit, underscoring the essential function of technology in improving operational efficiency and customer satisfaction (Lu et al., 2019). The findings are consistent with research indicating that the adoption of technology in tourism promotes economic growth and enhances customer engagement (Leung, 2022; El Khatib et al., 2023). Audina et al. (2024) demonstrated that information and communication technology (ICT) significantly enhances economic growth through improvements in service quality and operational efficiency. This is consistent with our findings, indicating that ICT and RAISA have a significant effect on customer satisfaction and economic benefits within Dubai's tourism sector.

Additionally, RAISA technologies have revolutionized service delivery by facilitating personalized customer experiences and enhancing service automation (Wirtz et al., 2018; Tung & Au, 2018). The findings align with theoretical frameworks that highlight the role of technology in improving service quality and optimizing resource use (Gössling & Hall, 2019).

5. Implications

This study's findings present multiple implications for both the short term and the long term. In the short term, prioritizing investments in ICT infrastructure and RAISA technologies can enhance service quality and customer satisfaction effectively. Implementing focused workforce training enhances employee proficiency in advanced technologies, while formulating data-driven customer engagement strategies optimizes user experiences.

Long-term public-private partnerships can sustain technological innovation in the tourism sector. The integration of eco-friendly technologies promotes sustainable tourism practices, while ongoing training programs ensure workforce adaptability to evolving technology.

Future research should examine the comparative effects of ICT and RAISA in diverse smart tourism destinations, undertake longitudinal studies to evaluate their long-term economic benefits, and explore the influence of emerging technologies beyond ICT and RAISA in the tourism sector.

6. Conclusions

This study illustrates the significant influence of Information and Communication Technology (ICT) and Robotics, Artificial Intelligence, and Service Automation (RAISA) on the tourism sector in Dubai. These technologies have markedly improved service quality, optimized resource use, and fostered economic growth. The government's proactive role, characterized by supportive policies, strategic investments, and collaborative initiatives, has been crucial in developing a technology-driven tourism ecosystem. The findings highlight the need for ongoing investment in ICT infrastructure, focused workforce training, and strong data protection measures to sustain Dubai's competitive edge. Public-private partnerships represent a viable framework for promoting innovation, and the incorporation of environmentally sustainable technologies is consistent with Dubai's objectives for sustainable tourism development.

Ethical considerations

Not applicable.

Conflict of Interest

The authors declare no conflicts of interest.

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