Blockchain and Sustainable Tourism: Unlocking the Opportunities for a Greener Future

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Article

Blockchain and sustainable tourism: unlocking the opportunities for a greener future

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Abstract: This article presents a comprehensive review of the relationship in sustainable tourism and blockchain technology. The aim of this research is to explore the potential of blockchain to promote sustainable tourism, as well as to evaluate the current state of research and practical implementations in this field. The findings demonstrate the potential of blockchain in enhancing sustainability practices in tourism, while also highlighting the challenges and limitations. The study provides valuable insights for policymakers, industry practitioners, and researchers, and proposes future research directions to further advance the field.

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1. Introduction

Tourism is one of the largest and fastest-growing industries worldwide, delivering major economic benefits and job possibilities [1]. Tourism, on the other hand, can have severe environmental and social consequences ranging from carbon emissions and resource depletion to cultural commercialization and labour exploitation. In recent years, there has been a surge in interest in promoting sustainable tourism (ST), which aims to balance the economic, environmental, and social aspects of tourism for current and future generations [2].

BT has emerged as a promising instrument with the ability to support the development of ST and assist to the accomplishment of the United Nations Sustainable Development Goals (SDGs) [3]. Thus, BT and cryptocurrencies have emerged as auspicious tools for boosting ST, opening new avenues for transparency, security, and efficiency across the tourist value chain [4]–[6]. Blockchain can enable more efficient and trustworthy transactions, supply chain management, and data sharing, while cryptocurrencies can enable quicker and cheaper payments and assist sustainable projects like carbon offsetting and community development [6].

BT has received substantial interest in the field of tourism as a worldwide solution with the ability to accelerate the sector's digital transformation and unlock an extensive range of financial and logistical benefits [7], [8]. This article investigates the representation of BT in the tourism sector critically, examining its perceived capacities and assessing its ability to deliver on its promises, and it is exploring the consequences of using BT in tourism by evaluating current literature and cases study, considering its influence on transparency, security, efficiency, and involvement of stakeholders. Furthermore, this study addresses the challenges and limitations when using blockchain in the field of tourism, emphasizing the importance for exhaustive systems, regulations, and industry-wide cooperation to fully harness blockchain technology's revolutionary potential. The main goal is to strengthen a better awareness of blockchain's impact on the digital and financial evolution of ST by offering a comprehensive analysis, providing perspectives and suggestions for policymakers, industry professionals, and researchers searching for to comprehend the challenges and opportunities provided by this innovative technology.

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In spite of the possible advantages, the relationship between ST and blockchain remains unexplored and unstudied. This review article seeks to address that void by giving a thorough overview and analysis of the available literature on the subject. We will specifically look at the potential uses, problems, and limits of blockchain in promoting ST, using cases study and best practices from throughout the world. We intend to contribute to a deeper understanding of how blockchain may aid in the shift to more sustainable and responsible tourist practices by doing so.

The remaining sections of this paper will dig into a thorough examination of the relationship between BT and ST. Section 2 will conduct a detailed literature analysis, reviewing current research and conceptual frameworks that shed light on blockchain's potential in encouraging ST practices. Section 3 will give a cases study that will analyse a real-world deployment of BT in a ST setting to highlight its practical uses and consequences. Section 4 will discuss the challenges and limitations encountered when using blockchain into ST efforts. Section 5 will explore the policy implications of BT for ST, highlighting the potential for regulatory frameworks and industry norms to facilitate its implementation. Section 6 will wrap up the article by summarizing the important results and insights gained during the investigation. Section 7 will recognize the study's limitations, noting opportunities for improvement and future research. Finally, Section 8 will present future research suggestions, highlighting new routes for expanding awareness and comprehension in the realm of blockchain and ST.

2. Literature Review

ST aims to reduce negative environmental, social, and economic consequences while increasing positive benefits for local communities, economies, and ecosystems [9]–[11]. It entails incorporating environmental, social, and economic factors into all elements of tourism development and administration. Yet, implementing ST is frequently difficult since it involves balancing opposing interests and agendas, as well as resolving complex and linked concerns [11]–[13].

Environmental effect is one of the most significant difficulties of ST. Tourism can exacerbate climate change, water shortages, biodiversity loss, and other environmental issues. This necessitates the implementation of policies to minimize carbon emissions, manage water resources, conserve biodiversity, and encourage sustainable consumption and production patterns. Another issue confronting ST is social responsibility. Tourism may have both beneficial and negative social repercussions, depending on how much it respects and helps local cultures, beliefs, and traditions. To encourage social responsibility, ST should include community participation, capacity building, and equitable benefit sharing. Lastly, economic viability issues confront ST. Tourist operations can assist local communities economically, but they can also lead to economic dependency, inequality, and susceptibility to external shocks. Diversification, entrepreneurship, and local ownership of tourist firms, as well as support for innovation and technology, are all required for ST [9], [13].

BT is frequently portrayed in the tourist industry as a worldwide technology that would enable the sector to accomplish its digital revolution and deliver a slew of financial and logistical benefits [7], [8], [14]. Therefore, blockchain is a digital ledger system that is decentralized and allows for safe, transparent, and efficient transactions without the use of intermediary. Cryptocurrencies are digital assets that use encryption to secure transactions and regulate unit creation. Blockchain and cryptocurrency, when combined, have the potential to revolutionise numerous parts of the tourist business [8], [15]. Payments are one possible application of blockchain and cryptocurrencies in tourism. Without the need for intermediaries such as banks, cryptocurrencies can enable quicker, cheaper, and more secure payments. This has the potential to assist both travellers and tourism companies, particularly in distant or underbanked locations. Supply chain management is another possible application of blockchain and cryptocurrencies in tourism. Tourism items and services such as food, lodging, and excursions may benefit from a transparent and verifiable record of their origin, reliability, and sustainability due to BT. This can aid in the prevention of fraud, the increase of customer trust, and the promotion of sustainability programs such as fair trade and eco-certification. Lastly, blockchain and cryptocurrencies can aid in the development of sustainable tourist projects such as carbon offsetting and community development [16]. With cryptocurrency-based platforms, travellers may make direct

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payments to community-led tourism projects or offset their carbon footprint. BT may potentially be used to create decentralized autonomous organizations (DAOs) that administer tourist resources and activities in an open and democratic manner.

Overall, the link between ST and BT presents exciting potential for fostering more environmentally friendly and responsible tourist activities. A partnership-based strategy among stakeholders might be a solution to the issues of blockchain acceptance in the tourist sector [17]. Realizing these prospects, however, necessitates overcoming several problems and constraints, including as scalability, regulatory concerns, and energy consumption, as well as guaranteeing equitable benefit sharing and encouraging social and environmental responsibility.

3. Cases Study: Examples of Blockchain/Cryptocurrency-Based Sustainable Tourism Projects

BT has the potential to be a very useful combination for the tourism sector in the future smart society [5], [8], [18], [19]. Since they have the potential to encourage sustainable tourist practices, the adoption of blockchain and cryptocurrencies in the tourism sector has gained traction [3], [16]. This section examines and analyses 8 cases study of sustainable projects that employ directly or indirectly blockchain and cryptocurrency to promote ST/sustainability on tourism sector. Following are some examples of blockchain-based ST initiatives:

Table 1. Cases study, description and website.

Case Study	Description	Website
TripEcoSys	TripEcoSys is a blockchain-based platform focused on ST with the goal of increasing accountability, efficacy, and transparency in the travel sector. TripEcoSys uses BT to provide security and decentralized transactions, smart contracts, and verified evaluations, all of which help to increase confidence among passengers, service providers, and other stakeholders. The website stresses environmentally friendly practices, allowing passengers to make educated selections by obtaining credible information about eco-friendly lodgings, ethical travel agents, and local conservation projects. TripEcoSys' vision is to build a worldwide ecosystem that encourages ST while also providing a smooth and secure travel experience [16].	https://github.com/TripEcoSys
Travel Coin (TCOIN)	TCOIN is a blockchain-based digital asset particularly created for the travel and tourism sector. This currency attempts to incentivise sustainable travel behaviors by paying travellers that engage in ecologically beneficial acts such as selecting eco-friendly lodging, contributing in community conservation initiatives, or promoting ST projects.	https://tcoin.one
Winding Tree	Winding Tree is a blockchain-based system that promises to decentralize the tourism sector by connecting providers and consumers directly. This can lessen dependency on middlemen like booking websites while also lowering transaction fees for both providers and customers. Winding Tree also encourages sustainability by making it possible to include ST activities, such as carbon neutral initiatives, into travel bookings.	https://windingtree.com

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Backpacker-Coin (BPC)	BPC is a cryptocurrency created to promote the tourism industry to solve problems for travellers. One of the main problems is the numerous credit card fees that the conventional banking industry applies. Another constraint is exchanging rates and travel bookings, which means visitors losing money on different transactions. Thus, the aim of this project is to hold a cryptocurrency that solves all these problems ailing current and future generations of travellers around the world, that is, they have created BackPacker Coinoffers which has low transaction costs with instant payment capabilities. This currency is designed to encourage visitors to engage in sustainable actions such as reducing their carbon footprint and helping local communities. Finally, rewards can be earned by engaging in activities such as: promoting the BPC on social media platforms (YouTube, Twitter, and Facebook) with positive feedbacks (earning up to 1000 USD); and, via mining, which is an essential part of the functioning of the global Backpacker Coin ecosystem. Miners are users that dedicate computing resources or hold coins in place for securing and validating the transactions. Also, BPC wallets are available for download on IOS; windows; android; Linux; web; among others.	https://backpacker-coin.com
GoCrypto	GoCrypto has the potential to improve the economic viability of Slovenian tourism hotspots by allowing tourists to pay for products and services using cryptocurrency. Because retailers may avoid costly transaction fees and currency rates, this can lower transaction costs and boost tourism expenditure in local economies. The site also encourages financial inclusion by allowing travellers who do not have access to regular banking institutions to utilize bitcoins. Nevertheless, the initiative's success is dependent on visitor uptake of cryptocurrencies and the availability of infrastructural facilities, such as cryptocurrency exchanges and wallets. It is also critical to guarantee that the platform is easy to use and accessible to all travellers, even those who are unfamiliar with cryptocurrency.	https://gocrypto.com
ImpactPPA	ImpactPPA is a blockchain-based platform that allows for decentralized renewable energy projects in underdeveloped nations. It enables investors to fund solar, wind, and hydro power projects using cryptocurrencies while also providing a transparent and auditable record of energy production and distribution. This can assist local populations by giving access to clean, inexpensive energy while also reducing carbon emissions from tourism-related activities.	https://www.impactppa.com
ClimateCoin	ClimateCoin is a cryptocurrency that is used to fund carbon offset and climate change mitigation programs. It allows users to invest in sustainable forestry, renewable energy, and clean technology initiatives via a	https://www.climate-coin.com

	blockchain-based platform while also providing a public and verifiable record of the impact of their investments. The program can help tourist firms and destinations offset their carbon footprints and encourage ST practices.	
Clean Ocean	The Clean Ocean Token is a blockchain-based cryptocurrency that intends to reward individuals and organizations who participate in ocean cleaning efforts to incentivise the elimination of ocean trash. Activities that involve beach clean-up, recycling, and ocean research can earn the token. This token may encourage environmental stewardship and create consciousness about the impact of plastic litter on marine habitats, which is one possible advantage for ST. The token can help reduce the quantity of plastic garbage in seas by rewarding clean-up actions, which can enhance the general health of marine habitats and make them more desirable to tourists. Furthermore, by establishing job opportunities and supporting small enterprises that participate in ocean cleaning efforts, the "Clean Ocean Token" can give economic advantages to local communities. This can help to foster the development of environmentally responsible and socially responsible tourist activities. In general, the "Clean Ocean Token" holds the potential to play a significant role in encouraging ST by motivating ocean cleaning operations, increasing awareness of plastic waste, and assisting local communities.	https://cleanocean.io

Source. Own elaboration

Cases study of blockchain and smart contract applications in the tourist sector were examined to uncover opportunities to innovate existing tourism firms' ecosystems employing BT. These examples demonstrate the potential for blockchain and cryptocurrencies to promote ST by enabling transparent and efficient transactions, promoting responsible tourism practices, and facilitating financial inclusion for marginalized populations [16]. However, there are also challenges and limitations, such as scalability, regulatory issues, and the potential for energy consumption, that need to be addressed to maximize the potential of these technologies in ST [19]. Further study and assessment are required to determine the efficacy and scalability of these projects, as well as to define best practices and standards for ST utilizing blockchain and cryptocurrencies.

These are some instances of ST programs that have used blockchain and cryptocurrency to encourage environmentally friendly behaviors. These programs have the potential to decrease environmental consequences, encourage responsible tourism behavior, improve economic sustainability, and expand financial inclusion. Its influence and efficacy, however, are dependent on a few factors, including platform acceptance and utilization, the availability of infrastructure improvements, and the amount of engagement and collaboration among stakeholders. As a result, it is critical to thoroughly examine the efficacy and scalability, as well as monitor the impact of projects to ensure that they contribute to ST practices and promote beneficial results for all parties involved.

4. Blockchain/Cryptocurrency Challenges and Limitations in Sustainable Tourism

While blockchain and cryptocurrencies can enhance tourist sustainability [16], there are numerous issues and boundaries that must be solved before they can reach their full potential. Some of the major issues and limitations are as follows: (i) Scalability - BT uses a decentralized network of computers to validate and execute transactions, it is less fast and effective than traditional centralized

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systems. This might make large-scale integration of blockchain-based projects in ST more difficult; (ii) Regulatory concerns - the regulatory environment surrounding blockchain and cryptocurrency is complicated and differs by nation. In the absence of clear and uniform laws, ST initiatives may struggle to operate legally and achieve public acceptability; and (iii) Energy consumption - verifying and executing transaction on a blockchain network necessitates a large amount of computational power and energy. This can result in large carbon emissions, undermining the long-term benefits of blockchain-based efforts [15], [20].

To overcome these problems and restrictions, a thorough and collaborative strategy is required. Among the possible recommendations are: (i) Creating scalable and efficient blockchain systems capable of handling huge quantities of transactions while maintaining security and decentralization; (ii) Collaboration with regulators and policymakers to provide clear and uniform guidelines for the use of blockchain and cryptocurrencies in ST; (iii) Investigating more energy-efficient and ecologically sustainable BT and consensus methods; (iv) Collaboration with energy firms to develop sustainable energy solutions for blockchain networks; (v) Visitors, local economies, and other stakeholders are being educated and incentivized to engage in blockchain-based programs that promote ST; (vi) There is a need to raise awareness and educate the tourist sector concerning the potential benefits and limits of blockchain and cryptocurrencies. This might involve creating training programs for tourism stakeholders like tour operators and hotel management to assist them in comprehending how cryptocurrencies and the blockchain can be effectively used to promote ST; and (vii) Collaboration among stakeholders such as governments, companies-, and local communities is critical for overcoming the issues connected with cryptocurrencies and the blockchain in the tourist industry. This might involve forming public-private partnerships for funding and deploy blockchain-based solutions [3], [15], [19], [20].

To summarize, while there are certain problems and restrictions to adopting blockchain and cryptocurrencies in ST, they may be solved via joint efforts and innovative solutions. ST projects can enhance environmental, social, and economic sustainability in the tourism industry by harnessing the possibilities of blockchain and cryptocurrencies.

5. Policy Implications

The intersection of ST and blockchain/cryptocurrencies confronts policymakers with several potential and concerns. On the one hand, the use of blockchain and cryptocurrencies in ST may enhance transparency, efficiency, and innovation, as well as contribute to the accomplishment of SDGs. Policymakers, on the other hand, must address the constraints and limits of these technologies to assure their efficacy and sustainability.

One of the most important policy consequences of this connection is the need for regulatory systems that support innovation while also protecting consumers, businesses, and the environment [16]. Governments must weigh the potential advantages of blockchain and cryptocurrencies against the dangers of fraud, money laundering, and increased energy usage. They must also guarantee that these technologies do not worsen social and economic inequities and do not jeopardize users' privacy or security. Another policy issue is the need for capacity-building and awareness-raising programs to assist blockchain and cryptocurrency adoption and integration in ST. Policymakers must involve stakeholders from several areas, such as tourism, business, and technology, and give them with the skills and knowledge they need to use these technologies efficiently and ethically. They must also encourage public-private collaborations to fully realize the promise of these technologies and address the issues of ST.

Finally, the link between ST and blockchain/cryptocurrencies confronts policymakers with both potential and problems. Policymakers may contribute to the fulfilment of sustainable development goals and encourage responsible and inclusive tourist practices by addressing the problems and leveraging the promise of these technologies.

6. Conclusion

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The link between ST and blockchain/cryptocurrencies offers a viable route for promoting sustainable tourist practices and improving the economic sustainability of tourism destinations. While there are several hurdles and constraints to using blockchain and cryptocurrencies in ST, such as scalability, legal concerns, and the potential for energy consumption, the potential advantages of these technologies cannot be overlooked. The cases study shows how blockchain and cryptocurrencies may be used to promote sustainable tourist practices and improve the economic viability of tourism locations.

Cryptocurrencies, smart contracts, and decentralized apps have started to have an impact on tourism transactions [18]. Therefore, this study suggests that stakeholders of tourism industry can use BT to innovate their ecosystems and create new opportunities for innovative businesses [16].

BT is seen to be an ideal solution for removing intermediaries from the tourist industry's supply chain [8]. Thereupon, artificial intelligence and BT can improve environmental, social and economic sustainability in the Middle East and North Africa region by replacing traditional practices and policies with innovative technologies [21]. However, small island economies are at the leading edge of blockchain adoption [22].

Thus, to realize the full potential of blockchain and cryptocurrencies in ST, governments and stakeholders must collaborate to overcome the technologies' problems and constraints. This might involve creating legislation and regulations to ensure the appropriate usage of blockchain and cryptocurrencies, as well as investing in infrastructural facilities and technologies and raising awareness and education among visitors and local populations. Overall, the use of blockchain and cryptocurrencies in ST is a potential development in the continuous efforts to promote ST practices and improve the economic sustainability of tourism destinations.

7. Limitations

While this review paper provides a detailed overview of the possible advantages and problems of utilizing blockchain and cryptocurrencies to promote ST, the scope of this study has several limitations. To begin, the cases study described in this article are constraints, which might not be indicative of other blockchain/cryptocurrencies-based ST ventures. Other efforts in various places or with different goals may give more insights into the issue. Second, the analysis offered in this paper is based on current literature, so it could be restricted in scope and might not capture all the subject's intricacies.

Eventually, as blockchain and cryptocurrency technology evolves and new applications are discovered, the potential advantages and concerns described in this study may alter. Furthermore, practical hurdles such as a lack of infrastructure, technical skills, and financial resources may impede the adoption of blockchain and cryptocurrency efforts in ST. Despite these constraints, this review article emphasizes the potential for blockchain and cryptocurrencies to make contributions to ST by increasing transparency, accountability, and cooperation between stakeholders, while also recognizing the challenges and limitations that must be addressed for successful implementation.

8. Future Research Proposals

The implementation of blockchain and cryptocurrencies in ST is a relatively young topic of study, there are various areas where further research is needed to properly comprehend these technologies' potential. The following are potential prospective study ideas to assist enhance knowledge and understanding of the relationship between ST and blockchain/cryptocurrencies: (i) Examine the potential for blockchain and cryptocurrencies to improve the transparency and traceability of supply chains in the tourist industry, such as food and beverage, transportation, and lodging; (ii) Explore the social, economic, and ecological effects of blockchain and cryptocurrency projects in ST, including all the implications on local communities, jobs, and carbon emissions; (iii) Investigate the potential for blockchain and cryptocurrencies to improve tourism destinations' resilience and flexibility to the effects of climate change, natural catastrophes, and other global concerns; and (iv) Examine the regulatory and legal difficulties involved with the usage of blockchain and cryptocurrencies in ST,

especially data protection, privacy, and intellectual property concerns; (v) Do cases study of ST projects in various regions of the globe that use blockchain and cryptocurrencies to acquire a more thorough knowledge of the potential impact and success of these activities.

By addressing these study ideas, researchers and practitioners will be able to get a better knowledge of the potential benefits and limits of blockchain and cryptocurrencies in ST, as well as devise methods to maximize their influence on the sector.

References

[1] R. Haylock, "The European timeshare market: The growth, development, regulation and economic benefits of one of tourism's most successful sectors," Tour Manag, vol. 15, no. 5, pp. 333–341, Oct. 1994, doi: 10.1016/0261-5177(94)90087-6.

[2] F. Neto, "A new approach to sustainable tourism development: Moving beyond environmental protection," Nat Resour Forum, vol. 27, no. 3, pp. 212–222, Aug. 2003, doi: 10.1111/1477-8947.00056.

[3] I. Tyan, M. I. Yagüe, and A. Guevara-Plaza, "Blockchain Technology's Potential for Sustainable Tourism," in Information and Communication Technologies in Tourism 2021, Cham: Springer International Publishing, 2021, pp. 17–29. doi: 10.1007/978-3-030-65785-7_2.

[4] R. L. Rana, P. Giungato, and C. Tricase, "Implementation of Blockchain Technology in the Tourism Industry: A Systematic Literature Review," in Basiq International Conference, Aug. 2021, pp. 594–602. doi: 10.24818/BASIQ/2021/07/075.

[5] D. Calvaresi, M. Leis, A. Dubovitskaya, R. Schegg, and M. Schumacher, "Trust in Tourism via Blockchain Technology: Results from a Systematic Review," in Information and Communication Technologies in Tourism 2019, Cham: Springer International Publishing, 2019, pp. 304–317. doi: 10.1007/978-3-030-05940-8_24.

[6] S. Varelas, P. Georgitseas, F. Nechita, and A. Sahinidis, "Strategic Innovations in Tourism Enterprises Through Blockchain Technology," in Strategic Innovative Marketing and Tourism, 2019, pp. 885–891. doi: 10.1007/978-3-030-12453-3_102.

[7] I. Antoniadis, K. Spinthiropoulos, and S. Kontsas, "Blockchain Applications in Tourism and Tourism Marketing: A Short Review," in Strategic Innovative Marketing and Tourism, 2020, pp. 375–384. doi: 10.1007/978-3-030-36126-6_41.

[8] W. Rashideh, "Blockchain technology framework: Current and future perspectives for the tourism industry," Tour Manag, vol. 80, p. 104125, Oct. 2020, doi: 10.1016/j.tourman.2020.104125.

[9] A. Budeanu, G. Miller, G. Moscardo, and C.-S. Ooi, "Sustainable tourism, progress, challenges and opportunities: an introduction," J Clean Prod, vol. 111, no. 2016, pp. 285–294, Jan. 2016, doi: 10.1016/j.jclepro.2015.10.027.

[10] WEF, "The Travel & Tourism Competitiveness Report 2019," 2019.

[11] UNWTO, Sustainable Tourism for Development Guidebook - Enhancing capacities for Sustainable Tourism for development in developing countries. Madrid, Spain: World Tourism Organization (UNWTO), 2013. doi: 10.18111/9789284415496.

[12] F. Arrobas, J. Ferreira, E. Brito-Henriques, and A. Fernandes, "Measuring tourism and environmental sciences students' attitudes towards sustainable tourism," J Hosp Leis Sport Tour Educ, vol. 27, no. 100273, pp. 1–12, Nov. 2020, doi: 10.1016/j.jhlste.2020.100273.

[13] S.-Y. Pan, M. Gao, H. Kim, K. J. Shah, S.-L. Pei, and P.-C. Chiang, "Advances and challenges in sustainable tourism toward a green economy," Science of The Total Environment, vol. 635, no. 2018, pp. 452–469, Sep. 2018, doi: 10.1016/j.scitotenv.2018.04.134.

[14] E. Fragnière et al., "Blockchain Technology in the Tourism Industry: New Perspectives in Switzerland," Journal of Innovation Economics & Management, vol. 37, no. 1, pp. 65–90, Jan. 2022, doi: 10.3917/jie.pr1.0111.

[15] S. B. Hojeghan and A. N. Esfangareh, "Digital economy and tourism impacts, influences and challenges," Procedia Soc Behav Sci, vol. 19, pp. 308–316, 2011, doi: 10.1016/j.sbspro.2011.05.136.

[16] J. Joo, J. Park, and Y. Han, "Applications of Blockchain and Smart Contract for Sustainable Tourism Ecosystems," 2021, pp. 773–780. doi: 10.1007/978-981-15-5258-8_71.

[17] R. L. Rana, N. Adamashvili, and C. Tricase, "The Impact of Blockchain Technology Adoption on Tourism Industry: A Systematic Literature Review," Sustainability, vol. 14, no. 12, p. 7383, Jun. 2022, doi: 10.3390/su14127383.

[18] K. Nam, C. S. Dutt, P. Chathoth, and M. S. Khan, "Blockchain technology for smart city and smart tourism: latest trends and challenges," Asia Pacific Journal of Tourism Research, vol. 26, no. 4, pp. 454–468, Apr. 2021, doi: 10.1080/10941665.2019.1585376.

[19] B. C. G. Kumar, P. Nand, and V. Bali, "Opportunities and Challenges of Blockchain Technology for Tourism Industry in Future Smart Society," in 2022 Fifth International Conference on Computational Intelligence and Communication Technologies (CCICT), IEEE, Jul. 2022, pp. 318–323. doi: 10.1109/CCiCT56684.2022.00065.

[20] I. Erol, I. O. Neuhofer, T. Dogru (Dr. True), A. Oztel, C. Searcy, and A. C. Yorulmaz, "Improving sustainability in the tourism industry through blockchain technology: Challenges and opportunities," Tour Manag, vol. 93, p. 104628, Dec. 2022, doi: 10.1016/j.tourman.2022.104628.

[21] M. A. Kashem, M. Shamsuddoha, T. Nasir, and A. A. Chowdhury, "The role of artificial intelligence and blockchain technologies in sustainable tourism in the Middle East," Worldwide Hospitality and Tourism Themes, vol. 15, no. 2, pp. 178–191, Mar. 2023, doi: 10.1108/WHATT-10-2022-0116.

[22] A. O. J. Kwok and S. G. M. Koh, "Is blockchain technology a watershed for tourism development?," Current Issues in Tourism, vol. 22, no. 20, pp. 2447–2452, Dec. 2019, doi: 10.1080/13683500.2018.1513460.