Blockchain Applications in Tourism and Tourism Marketing: A Short Review

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Abstract Blockchain is one of the most prominent and discusses technologies of the twenty-first century that has the potential to change, the way that we are conducting business, payments, and the management processes in a big number of industries. Based on the Distributed Ledger Technology (DLT), blockchain applications provides a breakthrough and innovative solutions due to the security they offer to the participants of the network, the efficiency of record keeping and transaction execution, and the automation solutions in terms of executing contracts when certain conditions are met (smart contracts). Despite the fact that most literature concerning blockchain focuses on its use in the finance industry and cryptocurrencies, there is a growing interest in the ways that this technology could be applied in other industries and management processes as well, both in the private and the public sector. In this paper, we are going to review the main propositions and findings in the literature concerning the use of blockchain technology in tourism and tourism marketing. We identify potential uses of blockchain in the tourism and hospitality industry in general and outline the benefits derived, and the challenges that will arise from the adoption of this innovative technology. Finally, we point out some direction for future research on the topic.

Keywords Blockchain · Applications · Tourism · Tourism marketing

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1 Introduction

Blockchain has gained a formidable reputation as the new technology that will dramatically change the way that business and organizations both in the private and public sector alike will operate in the years to come. The advent of blockchain technology and especially the success of its most prominent application to date, the cryptocurrency Bitcoin, has triggered a lot of media attention in recent years. This fact created a huge amount of interest across various industries [1–3] and a vivid public debate on the role and usage of the new technology.

The tourism industry is also under a period of transformation. The tourism industry has been changing rapidly since the Internet has enabled customers to search for and book their travel products online [4]. New technologies and business models have been transforming gradually the industry introducing concepts like smart tourism [5] and the extended use of information technology and social media [6, 7] shifting the balance of control from firms to tourists.

Blockchain can lead to further and more radical disruption of the current business models in tourism and tourism marketing, in the ways it offers and communicates its value proposition for its customers-tourists [8]. Major companies of the sector like TUI and Eurowings have already expressed their intention to test and adopt blockchain technology in their booking, reservation and payment systems [9, 10].

Notwithstanding, the importance and the potential of the use of this new technology in tourism development in every aspect of the value chain [11], research on the subject do not seem to keep up with industry's developments [12]. In this paper, we will attempt to briefly review the ways this new technology operates and its main characteristics, the possible uses and applications of blockchain in tourism and tourism marketing, and the research directions suggested by the relevant literature.

The remainder of the paper is structured as follows. The next section presents the underlying technology of blockchain and its characteristics. Section 3 briefly discusses blockchain applications in general and the research directions proposed by relevant literature. Section 4 discusses the potential applications of blockchain technology in tourism and tourism marketing with short case studies. Finally, the paper concludes with the discussion of the potential of blockchain offers for tourism, and by offering suggestions for future research.

2 Blockchain and Distributed Ledger Technology

Blockchain technology was the basis of Bitcoin, a peer to peer cryptographic payment system, created by Nakamoto [13], as a response to the lack of trust to the global financial created by the financial crisis of 2008. Bitcoin was one of the first applications of the Distributed Ledger Technology (DLT) that is in the essence of blockchain.

A blockchain consists of a distributed database of records (ledger) that is decentralized and records all transactions between the participating members of the blockchain [14]. The blockchain can be public or private and it is important to note that the governance of the network can be open to the public (permissionless) or closed (permissioned), where blockchains are private or consortium operated [1, 3].

The benefits of blockchain soon became obvious that extended far beyond the cryptocurrency applications. It offers a way of performing and recording transactions and updating payments in multiple (decentralized) distributed databases (ledgers), with identical copies maintained on numerous computer systems, controlled by different entities without a single centralized authority. Any digital interaction is traceable through a transparent and secure structure, that is resistant to both external and internal hacking attacks [15]. The enablement of performing almost real-time transactions of digital assets, on a distributed ledger made it a promising tool for the executing private contracts, or storing data, in unprecedented levels of security and efficiency, in multiple areas of economic activities [16].

Blockchain technology has six main characteristics [3, 17] that makes it suitable for a number of applications. Those are the decentralized nature and operation, transparency of data's records, open source access, autonomy and trust, immutability, and anonymity. The above characteristics also lead to enhanced security and auditability of the overall system [1, 2, 16], while the lack of intermediaries, build trust on the system, reduce the costs related to the transaction and maintaining a central database of records, and the risks of a collapse of the network due to malicious attacks [18].

Another important aspect of the technology that was introduced by Nick Szabo in 1997 and became very popular with the introduction of Ethereum [19] is smart contracts. Those contracts are executed within the blockchain in the case where there is a consensus between the involved parties that the terms of the contract are fulfilled. This is an automated procedure in a blockchain that does not need intermediaries for its completion, reducing hence transaction costs, and the lack of trust between the engaged parties [15].

Eliminating the need for intermediaries by providing the means for "writing down" a smart contact between the provider and the user of services, that is secure creates great opportunities for small firms as [20] suggests. Large firms (i.e. retailers, or tour operators) or even customers, might be inclined to increase their supplier networks and turn to smaller ones, as transaction costs go down, and trust is strengthened, providing thus business opportunities and competitive advantage to smaller firms. Those characteristics have drawn the attention of practitioners, and as [21] reports more than 50 industries would see their business model and operation be disrupted by the introduction of Blockchain in the years to come.

3   Blockchain Research Directions and Tourism

Irrespectively of the uncertain future of cryptocurrencies (like Bitcoin), due to their high risk and volatility [22] and their speculative use, the opportunities for applications of blockchain technology in both developed and markets are abundant [23, 24]. Describes these prospects as they foresee the evolution of blockchain from the digital currency in Blockchain 1.0 (Bitcoin) and digital finance in Blockchain 2.0 (Ethereum), to the digital society in Blockchain 3.0, with high levels of interoperability and scalability.

Blockchain technology will affect business models in three major ways [2], First, it will help build trust between the transacting parties by providing reliable platforms that will help authenticate traded goods, and validate transactions. Disintermediation is the second way, by providing wide and direct access to markets for businesses and consumers alike. And finally, blockchain will enhance operational efficiency and will help reduce operational costs for firms and organizations of both the public and the private sector alike.

The research on the issue is currently underdeveloped and has been focusing on the "behaviour" of Bitcoin in the market, and the financial aspects and applications of Blockchain as a way to facilitate all kind of financial transactions [25]. Distinguish three main areas of research on the application of blockchain technology in digital payments and transactions, but these can be extended to blockchain research in general [26]. These are (a) organizational issues related to the implementation of blockchain in everyday real-world business applications, (b) the interaction and the effect it will have with a competitive business environment, and finally (c) technology issues of the implementation [26]. Also identified four levels of analysis for each one of these research areas, that involve stakeholders affected by blockchain, namely users and society, intermediaries, platforms, firms, and industry.

Önder and Treiblmaier [12] suggest that tourism industry will be affected in the by the introduction of new paradigms and platforms of evaluation and review platforms, the adoption of cryptocurrencies and tokens by tourists and firms, and last but not least the limited role of intermediaries like tour operators that would result in changes in the industry market structure. Accordingly, they believe that future research on the issue should direct its focus in these three directions.

Kwok and Koh [11] also identify four main ways tourism and tourism marketing is going to be affected by introducing blockchain and its applications. The use of blockchain will enhance the tourists' experience due to the simplification of transactions with smart contracts. The main focus, however, remains in the financial aspects of the technology in the industry. Blockchain will also promote the tourists' experience through smart tourism [5, 27] and the augmenting effect it will have in smart cities as destinations [28].

Finally, Treiblmaier and Önder [29], examined the impact blockchain is going to have to the tourism industry under the prism of the four main organizational and strategic theories that explain the behavior of firms and organizations, namely agency theory, transaction cost theory, resource-based view of the firm and actor-

network theory. Their analysis provides insights on the ways that blockchain will affect the structure and operation of the tourism industry, but also the management and the strategic positioning of firms in the industry. In the following section, we are going to review some of the applications of blockchain in tourism and tourism marketing.

4 Blockchain Applications in Tourism

Blockchain applications in tourism can enhance tourism in various fields [10, 11, 30]. The application of smart contracts and DAPs will enhance smart tourism and the value proposition tourism firms and destinations offer to their guests-visitors [27]. In Fig. 1 we summarize some of the main applications of blockchain in tourism.

The applications of blockchain can change the ways we interact with customers and verify the content they generate for hotels and other venues that is of importance for tourism marketing [7, 32]. Loyalty programs in the form of collecting tokens can change the experience offered to the visitors of a hotel or a destination with the use of smart tourism and blockchain and facilitate the management of these programs [30]. Another issue that we should not underestimate, is the hype that blockchain and cryptocurrencies carry at the time. Adoption of the technology can be promoted and attract visitors, especially for destinations that lack comparative advantage like small islands [11].

Digital payments can be used with cryptocurrencies with customers (B2C) and suppliers (B2B), in conjunction with smart contracts to ensure the speed and security of transactions, creating trust and social capital between the participating parties [25]. Additionally, tourism firms can use Initial Coin Offerings (ICOs) in order to get access to the necessary fund, and cash flow, for investments and expansion to new activities that will improve the experience offered to their visitors [10].

Businesses are already experimenting with, and start implementing this new technology. The world-class tour operator TUI has adopted blockchain to keep real-time data records for their operation with smart contracts. The platform TUI has developed, BedSwap uses a blockchain-enabled system to maintain records of hotel bed inventories that can then be offered across markets cheaper, efficiently and instantly, abolishing the need for an intermediary [33].

Apart from the big companies of the industry that are already investing in the adoption of blockchain for their streamline operations, we should note that already new start-ups are created every day all around the world using blockchain technologies to provide business solutions or to raise funds in all industries including tourism [9, 27, 34]. Report 13 blockchain solutions in tourism that have used blockchain either to raise funds through ICOs, or by using tokens to provide services to tourists and firms. For example, Gozo is a blockchain platform (https://www.gozo.io) that offers solutions for loyalty and rewards programs for travelers through the collection of points that can be exchanged with travel rewards or crypto tokens (like Ethereum or the GOZO token) in an electronic wallet.
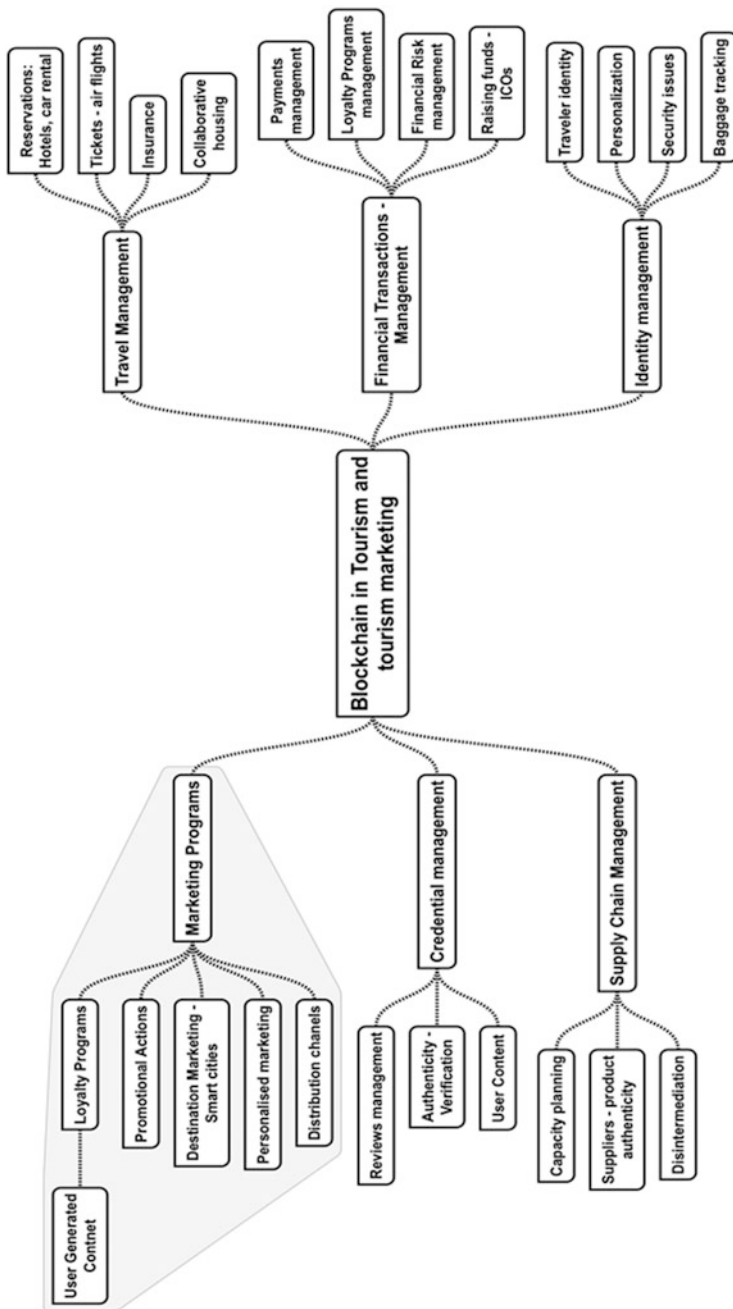
Fig. 1 Applications of blockchain in tourism (adopted from [10, 11, 31], own elaboration)

Another example of the use of blockchain in the tourism industry is Globaltourist (https://globaltourist.io) that uses Ethereum based token (TOTO) to encourage tourists to participate in a reviewing platform for the quality of tourism services. Winding Tree (www.windingtree.com) is a travel agent that also uses an Ethereum powered blockchain and tokens with smart contracts, allowing consumers to communicate directly with hotels, and property owners to book their accommodation, through a decentralized open source system. WindingTree (https://windingtree.com) has formed strategic alliances with various airline firms like Air New Zealand and Lufthansa [35], to explore the application of blockchain in air-tickets booking and baggage tracking.

Besides Bitcoin and the other cryptocurrencies, more specialized platforms in tourism like Tripago (https://www.tripagotravel.io) are created, permitting the creation of an electronic wallet that can be used for international transactions for tourists, without currency exchange issues. At the same time, new start-ups and firms use blockchain to raise funds for their development like the tourism rating service is Let's Trip (https://www.letstrip.io) that is currently running an ICO to get the necessary funds needed.

Another important aspect is the strategic implications and opportunities offered for smaller firms in the industry. Since there will be no need for intermediaries, small firms will be able to contact potential guests directly, without having to pay commissions to intermediaries like Expedia or Booking. Such an example of a blockchain start-up is Roomado (www.roomado.com), an online travel agent, that is focused on providing a range of travel services to small businesses using Ethereum based coins, as reported by Nam et al. [27].

5   Conclusions: Suggestions for Further Research

As larger firms and more stakeholders begin to realize the capabilities and the potential the technology has to offer solutions into real-world business problems and situations, blockchain technology will gain popularity and become the main issue in business and management. Notwithstanding its importance and its potential, there is still a great level of ignorance regarding blockchain and its potential application and impact it may have in tourism by all the involved parties and stakeholders [29].

The purpose of this paper was to shortly review some of the aspects concerning the application of blockchain in Tourism and tourism marketing, offering some insight into the existing literature and current applications. The academic discussion in the topic may still be in its early stages but it grows exponentially, as blockchain is becoming increasingly mainstream.

The focus still remains in the financial applications of blockchain in society and economy [1, 3, 16], and the technical issues accompanying the implementation of this technology. The same holds true about the tourism industry. Blockchain holds the potential of transforming the tourism value chain into a well-coordinated autonomous distributed network that will provide a great experience to tourists.

The successful implementation of blockchain will rely on creating links and interoperable networks within the tourism industry but also with related industries. Such an attempt will require substantial collaboration among tourism stakeholders (government, tourists, businesses and destination marketing organizations) that will help reinvent tourist experience, providing a competitive advantage to local and regional touristic markets and regions, contributing to regional and national economies.

The need for further and detailed research in the various aspects of blockchain application in Tourism is imperative since literature in the subject is still making its first steps [11, 12]. Future research could focus on investigating the readiness of both firms and tourists to adopt such a disruptive technology is of crucial importance. The use of appropriate models of technology adoption like TAM or UTAUT could provide insight into the factors that will influence the successful implementation of blockchain in tourism, for all stakeholders. The strategic impact of blockchain technology on the positioning of SMEs of the sector and the potential it has for marketing are also fields that worth the attention of researchers as we progress into a digital society.

References

1. Pilkington M (2016) Blockchain technology: principles and applications. In: Research handbook on digital transformation. Edward Elgar, Northampton, MA, pp 225–253. https://doi.org/10.4337/9781784717766.00019
2. Nowiński W, Kozma M (2017) How can blockchain technology disrupt the existing business models? Entrep Bus Econ Rev 5(3):173–188. https://doi.org/10.15678/EBER.2017.050309
3. Zheng Z, Xie S, Dai HN, Chen X, Wang H (2018) Blockchain challenges and opportunities: a survey. Int J Web Grid Serv 14:352–375. https://doi.org/10.1504/IJWGS.2018.095647
4. Kavoura A, Stavrianea A (2015) The importance of social media on holiday visitors' choice. The case of Athens, Greece. EuroMed J Bus 10:360–374. https://doi.org/10.1108/EMJB-03-2015-0016
5. Buhalis D, Amaranggana A (2015) Smart tourism destinations enhancing tourism experience through personalisation of services. In: Information and communication technologies in tourism 2015. Springer, Cham, pp 377–389. https://doi.org/10.1007/978-3-319-14343-9_28
6. Koo C, Gretzel U, Hunter WC, Chung N (2015) The role of IT in tourism. Asia Pac J Inf Syst 25:99–104. https://doi.org/10.14329/apjis.2015.25.1.099
7. Kavoura A, Nechita F (2017) An exploratory study of online destination images via user-generated content for southeastern rural Transylvania. In: Kiralova E (ed) Driving tourism through creative destinations and activities. IGI Global, Hershey, pp 45–66. https://doi.org/10.4018/978-1-5225-2016-0.ch003
8. Colombo E, Baggio R (2017) Tourism distribution channels: knowledge requirements. In: Knowledge transfer to and within tourism: academic, industry and government bridges. Emerald, Bingley, pp 289–301. https://doi.org/10.1108/S2042-144320170000008016
9. Fes N (2018) Blockchain in tourism: hope or hype. https://www.tourism-review.com/blockchain-in-tourism-world-news10635
10. Bell A, Hollander D (2018) Blockchain and distributed ledger technology at Travelport [White paper]. https://www.travelport.com/sites/default/files/travelport-blockchain-whitepaper.pdf

11. Kwok AO, Koh SG (2018) Is blockchain technology a watershed for tourism development? Curr Issue Tour:1–6. https://doi.org/10.1080/13683500.2018.1513460
12. Önder I, Treiblmaier H (2018) Blockchain and tourism: three research propositions. Ann Tour Res 72:180–182. https://doi.org/10.1016/j.annals.2018.03.005
13. Nakamoto S (2008) Bitcoin: a peer-to-peer electronic cash system
14. Crosby M, Pattanayak P, Verma S, Kalyanaraman V (2016) Blockchain technology: beyond bitcoin. Appl Innov 2:6–9
15. Yermack D (2017) Corporate governance and blockchains. Rev Finance 21:7–31. https://doi.org/10.1093/rof/rfw074
16. Böhme R, Christin N, Edelman B, Moore T (2015) Bitcoin: economics, technology, and governance. J Econ Perspect 29:213–238. https://doi.org/10.1257/jep.29.2.213
17. Lin IC, Liao TC (2017) A survey of blockchain security issues and challenges. Int J Netw Secur 19:653–659. https://doi.org/10.6633/IJNS.201709.19(5).01
18. Collomb A, Sok K (2016) Blockchain/distributed ledger technology (DLT): what impact on the financial sector? Digiworld Econ J 103:93–111
19. Wood G (2014) Ethereum: a secure decentralised generalised transaction ledger. Ethereum Project Yellow Paper
20. Gupta V (2017) The promise of blockchain. In: A world without middlemen. Harvard Business Review. https://hbr.org/2017/03/the-prom-ise-of-blockchain-is-a-world-without-middlemen
21. CBS Insights (2018) Banking is only the beginning: 50 big industries blockchain could transform. https://www.cbinsights.com/research/industries-disrupted-blockchain/
22. Antoniadis I, Sariannidis N, Kontsas S (2018) The effect of bitcoin prices on US dollar index price. In: International conference on applied economics. Springer, Cham, pp 511–521. https://doi.org/10.1007/978-3-030-02194-8_34
23. Niforos M (2018) Blockchain governance and regulation as an enabler for market creation in emerging markets (No. 30658). The World Bank
24. Zhao JL, Fan S, Yan J (2016) Overview of business innovations and research opportunities in blockchain and introduction to the special issue. Financ Innov 2:28. https://doi.org/10.1186/s40854-016-0049-2
25. Lindman J, Tuunainen VK, Rossi M (2017) Opportunities and risks of blockchain technologies–a research Agenda. In: Proceedings of the 50th Hawaii international conference on system sciences. https://doi.org/10.24251/HICSS.2017.185
26. Risius M, Spohrer K (2017) A blockchain research framework. Bus Inf Syst Eng 59:385–409. https://doi.org/10.1007/s12599-017-0506-0
27. Nam K, Dutt CS, Chathoth P, Khan MS (2019) Blockchain technology for smart city and smart tourism: latest trends and challenges. Asia Pac J Tour Res:1–15. https://doi.org/10.1080/10941665.2019.1585376
28. Shen C, Pena-Mora F (2018) Blockchain for cities—a systematic literature review. IEEE Access 6:76787–76819. https://doi.org/10.1109/ACCESS.2018.2880744
29. Treiblmaier H, Önder I (2019) The impact of blockchain on the tourism industry: a theory-based research framework. In: Business transformation through blockchain. Palgrave, Cham, pp 3–21. https://doi.org/10.1007/978-3-319-99058-3_1
30. Dogru T, Mody M, Leonardi C (2018) Blockchain technology & its implications for the hospitality industry. Boston Hospitality Review (Winter 2018), Boston University. http://www.bu.edu/bhr/files/2018/02/Blockchain-Technology-and-its-Implications-for-the-Hospitality-Industry.pdf. Accessed 10 Apr 2019
31. Nasarre-Aznar S (2018) Collaborative housing and blockchain. Administration 66:59–82. https://doi.org/10.2478/admin-2018-0018
32. Stavrianea A, Kavoura A (2015) Social media's and online user-generated content's role in services advertising. In: AIP conference proceedings, vol 1644. AIP, New York, pp 318–324. https://doi.org/10.1063/1.4907853

33. Marr B (2018) The awesome ways TUI uses blockchain to revolutionize the travel industry. https://www.forbes.com/sites/bernardmarr/2018/12/07/the-amazing-ways-tui-uses-blockchain-to-revolutionize-the-travel-industry/. Accessed 10 May 2019
34. Fadilpasic S (2018) The 5 best projects implementing blockchain in tourism. https://tokeninvestoronline.com/five-best-projects-implementing-blockchain-in-tourism/
35. Sundararajan S (2017) Air New Zealand, winding tree team up for blockchain exploration. Available https://www.coindesk.com/air-new-zealand-winding-tree-team-up-for-blockchain-exploration