Trust in Tourism via Blockchain Technology: Results from a Systematic Review

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Abstract. Trust-free and trust-regulated systems based on blockchain technology (BCT) are currently experiencing the maximum hype and promise to revolutionise entire domains. Tourism products (intangible services) are highly dependent on trust and reputation management that is traditionally centralised and delegated to "expected" reliable third-parties (e.g., TripAdvisor). Although BCT has only recently started approaching the tourism industry and being employed in real-world applications, the scientific community has already been extensively exploring the promises of BCT. Therefore, there is an impending need for organising and understanding current knowledge and formalise societal, scientific, and technological challenges of applying BCT in the tourism industry. This paper moves the first step, presenting a systematic scientific literature review of studies involving BCT for tourism purposes. Providing a comprehensive overview, actors, assumptions, requirements, strengths, and limitations characterising the state of the art are analysed. Finally, advantages and future challenges of applying BCT in the tourism area are discussed.

Keywords: Blockchain, Tourism, Systematic Review, Trust, Transparency

1 Introduction

Technological growth cyclically revolutionise entire domains. Concerning the tourism industry, the digitisation played a crucial role in the last decades, paving the way for commercial interactions among private individuals on large scale and establishing trends re-shaping the market. The digitisation of the communication channel shifted from being a marginal driver to being the key market-enabler [1]. The tourism domain is composed of several distinct sub-sectors (e.g., e-business, information retrieval, online purchasing, marketing, website analysis, and e-research methods). The rise of digital consumers, the growth of artificial intelligence (AI) techniques, the heterogeneity of digital platforms are defining a new dimension for trust and security. Considered to be "the key building block of society", trust plays an essential role in the formation and consolidation of business interactions and relationships [2]. For example, renting out a unit on Airbnb requires multiple levels of trust. From the *host* side, there is the need for trusting potential guests (e.g., respect toward both the host and the unit). From the guest side, it is essential to trust the host and the offered unit or service (e.g., to be adequate to their expectations). Both parties have to trust Airbnbs ability, integrity, and benevolence regarding booking and payment processes. In such a scenario, Airbnb is the provider

of the technical infrastructure, user interfaces, and the guidance/monitoring process. Moreover, it is also responsible for providing services such as insurance and user's reputation management. By doing so, Airbnb is the only responsible for establishing and maintaining trust among users. Unfortunately, current mechanisms cannot cope with strategic lies, malicious behaviours, and formation of deceiving coalitions. Therefore, there is the need for a pivotal technological innovation, since not a centralised entity nor an intermediary cannot address these problems [3]. Broadly acknowledged as the driver of a next technological revolution [4], blockchain technology (BCT) can create unique opportunities for the companies in the tourism sector. However, there is the need for downsizing the hype, because BCT are not going to change everything. For domains in a state of continuous transition, a reconciling and practical analysis of if, where, and how BCT can be employed to generate benefits is still missing.

Contributions: This paper proposes a systematic literature review to identify and analyse both theoretical perceptions and practical implementations of the BCT in the tourism domain. Moreover, it proposes a discussion of the results of the analysis, to enhance the understanding of the current state of the art, benefits, and challenges of applying BCT in tourism. The paper is organised as follows: Section 2 summarises the review methodology and data collection, Section 3 organises and presents the obtained results, Section 4 discusses the results presented in Section 3, lists open challenges, and details the elaborated features. Finally, Section 5 concludes and presents possible future works.

2   Review Methodology

To provide a comprehensive study, it has been opted for a systematic, rigorous and reproducible process of retrieval, selection, and analysis of relevant literature. This paper adheres to the procedure adopted and adapted by [5] (see Figure 1). Following the
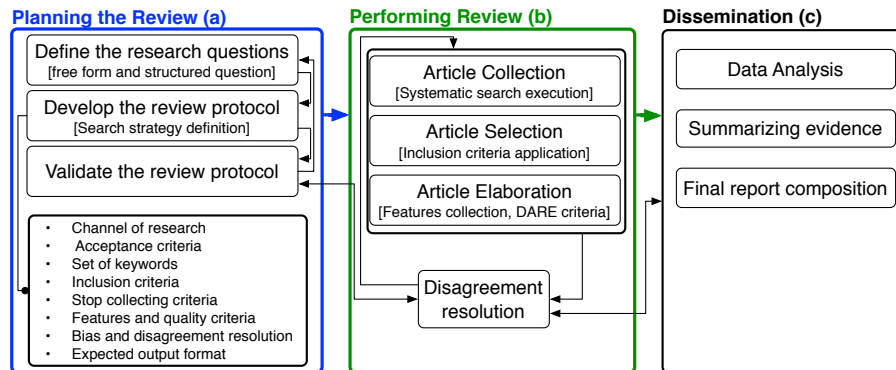

Fig. 1. Review Methodology Structure according to [6] and [7].

Goal-Question-Metric (GQM) [8], the generic free-form question *"What does involve the employment of BCT in tourism-related systems?"* is broken-down in the following structured research questions (SRQs).

SRQ1: How has the employment of BCT in Tourism applications evolved over the years in terms of when (year) and where (geographical indication of the scientific institute) such research took place?

SRQ2: What are the requirements and motivation demanding BCT in tourism?

SRQ3: What are the scenarios/areas used to design, test, or employ the blockchain technology? What are the requirements such approaches aimed at meeting?

SRQ4: Who are the entities subject to the trust evaluation?

SRQ5: What are the features and functionalities provided by the BCT that are relevant in the tourism area?

SRQ6: What are the strengths (improvements) and limitations of employing BCT in tourism-related systems?

SRQ7: What are the stated future research directions and challenges identified by the scientific community?

To perform a more accurate semi-automatic research, some keywords have been contextualised (keeping some keywords fixed in the performed queries). Based on the reviewers rooted backgrounds on BCT and tourism domains, the following keywords have been defined: **Fixed keywords:** (blockchain) * (hospitality `or` tourism) * **Variable Keywords:** (trusted systems + dmo + transportation + accommodation + services + hotel distribution + hotel industry + loyalty programs + travel + airline industry + publicity + restaurant + activity, transparency + event + e-governance + feedback + reviews + sharing economy).

The research of the articles has been conducted using the following sources: IEEExplore, Science Direct, Research Gate, and Google Scholar. The initial collection counted 70 papers, then reduced to 29 by performing a further coarse-grained examination. In particular, it has been analysed the compliance of the selected abstracts following the inclusion criteria listed below:

A) Context: The primary studies should define their contributions in the context of blockchain technology employed in the tourism-related systems.

B) Purpose: The purpose of primary studies has to refer to applying BCT seeking for transparency, loyalty, traceability, commitment, security, and trust in tourism.

C) Theoretical foundation: The primary studies should provide at least one of the following elements: [visionary formulation, theoretical definition, system design].

D) Practical contribution: The studies should provide at least one of the following elements: [practical implementation, tests, critical analysis, evaluations or discussion].

The main features extracted are: Article's abstraction[1], publication year, geolocalisation, application scenario, requirements, motivations, system features, functionality, assumptions, strengths, limitations, identified future challenges, players.

3 Results Presentation

This section presents the outcomes of the features collection process. Referring to question **RQ1**, the distribution of works tackling BCT in tourism is represented in Figure 2(a) – temporal and Figure 2(b) – geographical. It is worth to remark a booming interest on the topic. The lower amount of the selected paper written in the year 2018 is solely due to the delay in the indexing performed by the selected sources and to the period of the selection [2].
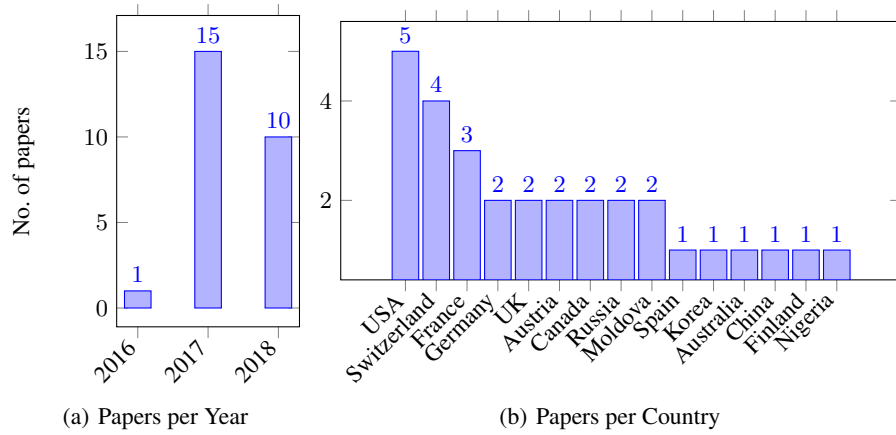
(a) Papers per Year   (b) Papers per Country

Fig. 2. Papers distribution.

SRQ2 focuses on the requirements and motivation that demand the use of BCT in systems operating in tourism. The primary studies elaborate on the challenges faced by the current solutions, indirectly addressing the requirements, which emerge to be tightly coupled with the application scenarios. In [2], the authors are driven by the promises and hype given by the new technologies. Improving *trustworthiness* [9–13] and resolving *security concerns* [10, 11, 14, 12, 15–17] are the common needs identified by most of the authors of the selected papers. The intention to *standardise* and *enforce the co-operation* between various actors are mentioned as other incentives [18, 11, 17]. The latter are linked to the intention of enabling *automation* and fostering *processes simpli-fication* [11, 12]. In [19, 20, 11, 21, 22] authors highlight the use of BCT to enhance the customer experience.

Addressing **SRQ3**, Table 1 sums up the mapping between the primary studies and their domains and applications. It is worth to mention that some studies focus on spe-cific applications (e.g., [18, 23, 22], and that others present more superficial contribution addressing various application scenarios in which BCT are employed (e.g., [11]), thus appearing several times in Table 1. Moreover, [34]and [20] have not been listed in Ta-ble 1 since they provide already aggregated information from third sources. Finally, to classify the typology of the contribution, the papers are categorised according to the maturity of their contribution (abstraction level[3]). The results show that the majority of the papers (20 out of 27) are still at the conceptual level.
A high potential for using blockchain technology is claimed to be possibly observed in the airline and hotel industry. The authors of [23, 24, 22, 25] focus on use-case sce-narios in the airline industry that are characterised by their complex systems consisting of a large conglomerate of different players. Whereas [23] elaborates the successful implementation of a blockchain-enabled E-commerce platform that offers more flexi-bility to employees of the Hainan Airlines (HNA) group, [22] focuses on the positive impact of BCT on enhancing customer loyalty programs in the airline business. Both

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[1] C = conceptual, P = prototype, T = tested
[2] Selection performed in June 2018
[3] Conceptual (C), Prototype (P), and Tested (T).

Domain	Application	Paper(s)
Airport / Hotel / Restaurant Industry	E-commerce platform for employees of HNA group	[23]
	Airline case study (e.g., flight planning, luggage chain)	[24]
	Customer loyalty programs; airline and hotel points	[11, 22]
	Identity management/ Digital ID (passenger terminal, hotel, restaurant)	[11, 25]
	Tracking hotel guests, food	[11]
	Transactions in the hospitality industry	[11]
Sharing Economy	Resource for sale, rental or co-usage	[2]
	Sharing App	[26]
	Online platforms for collaborative housing	[27]
	Online taxi-hailing platform	[15]
	Privacy in home sharing/room sharing	[10, 16]
Financial Transactions	Crypto-currency	[28, 9, 29]
	Left-over currency exchange framework	[14]
Identity Management	E-residency	[11]
Medical/Health tourism	Management system of Electronic Health Record (EHR)	[18]
Travel loyalty programs	Loyalty program in connection with using Credit Card	[30]
	POINTS (blockchain-based token)	[31]
Other Categories	Online consumer reviews	[9]
	Regional tourism market	[19]
	Mid- and long-term-tourism industry	[21, 1]
	Tourism as poverty alleviation	[32]
	Mobility as a Service (MaaS) ecosystem	[12]
	Concert tickets	[25]
	Pay-as-you go car insurance	[33]
	Online travel platform (travel trade)	[9]

Table 1. Mapping Domain - Application primary studies

application scenarios require the integration of multiple actors in one system. In the context of the E-commerce platform, the necessary standardisation tackles the inconsistency of options made available by the large number of subsidiaries [23]. Regarding the customer loyalty programs, the standardisation is required to overcome the missing cooperation between different providers [22]. The successful integration of various players in the network depends also on the ability to trust each other: without an intermediary present, the system itself needs to establish trust by its crowd of nodes on the blockchain network [22]. The provision of trust must be compliant with the concern of privacy and security [23, 22].

In other works, the authors consider not only the improvement of an existing platform/program but also the optimisation of larger components of the air transport industry. One of these components is the passenger terminal discussed in [25]. Exploring the opportunities and challenges, the author identifies blockchain as one of the emerging technologies that will migrate into the aviation sectorand will provide identity management solutions and organisation. Using blockchain for authentication is also accounted for in [24] together to the possibility to automatically connect the digital ID to loyalty programs and hotel booking for flight crews. Other use-case scenarios evaluated in [24] are the following: implementing tokens for payments (replacing credit cards), using blockchain for tracking baggage and automatised compensation using smart contracts. Overall, the authors expect that these applications will reform the entire airline industry and will lead to a more collaborative platform beyond the realm of a single airline.

In the hotel industry, the proposed use-case scenarios remain similar. The authors in [11] suggest using blockchain for tracking guests records, which is comparable to tracking

information about the luggage in the airline industry. In the restaurant industry food traceability is of high interest. However, in all the cases, for the application to be successful. the privacy of the customer has to be ensured [11, 24]. Another way of using BCT in the hotel industry is proposed in [11], and again, similar to the airline industry, it is concerning the loyalty programs on a blockchain platform. The advantages and opportunities of using BCT for loyalty programs in general are elaborated from a more mature perspective in [30, 31]. In [31] the authors propose blockchain-based tokens, called POINTS. In [30], the author takes a step further and proposes a model for integrating royalty-based tokens in the offline stores by connecting it with use of credit cards. Likewise, standardisation and privacy have to be ensured. Another BCT application in relation to the hotel and air industry, but not limited to it, is the improvement of online customer reviews of tourism products (such as hotels, restaurants, flights, events etc.) evaluated in [9, 21]. With respect to the current application, thereby, there is a demand for technological systems able to certify that the reviews are original and that cannot be manipulated by hoteliers nor by consumers [9]. Another important, if not essential, impact of blockchain on the hotel and air industry is seen in changing the structure of online travel platforms: shifting from relying on centralised intermediaries, to decentralised governance [9].

Looking at the implementation of blockchain technology in the sharing economy, the decentralisation is identified as an essential feature of the network. In [2], the authors examine the complex notion of trust in the sharing economy and the promise of the blockchain as a trust-free technology points at the replacement of trusted third parties (TTP) such as platform intermediaries. From a more practical perspective, the authors in [26] propose a decentralised sharing app based on BCT. In particular, it uses the ethereum blockchain, for regulating the renting of private assets. The app promises the non-involvement of TTP as well as the non-disclosure of personal information. From a touristic point of view, the adaption of BCT for applications in the sharing economy is especially interesting when looking at the example of home/room sharing. With regard to the issue of trust, the authors in [10, 16] look at the user's privacy requirements and how BCT can fulfil them while ensuring the systems safety. Whereas the majority of the works speak about the advantages of using BCT and its positive impact on online platforms for collaborative housing, in [27] the authors underline potential negative side effects such as higher rents for local people and so the reduction of access to affordable housing. Another application possibility, where data security requirements such as integrity and audibility of sensitive data are concerned, is discussed in [15] in the framework of an online taxi-hailing platform. The authors argue that a technical solution for privacy protection needs to consider various aspects such as for example the need of anonymity. As shows in Table 1, further works have identified specific application possibilities in other domains in tourism such as a blockchain-based management system of the e-health record in health tourism [18] and using blockchain for the distribution of concert tickets in event tourism [17].

SRQ4 investigates the entities subject to the trust evaluation (see Figure 3). Papers referring to end-user mapped into the system, mention employees, organisers, and suppliers [23, 30, 12] (e.g., hotels, and airlines [11, 25]), the tourists (e.g. business-man/woman), and local people operating in the destination as entities to be trusted [1, 28, 14] (e.g.,
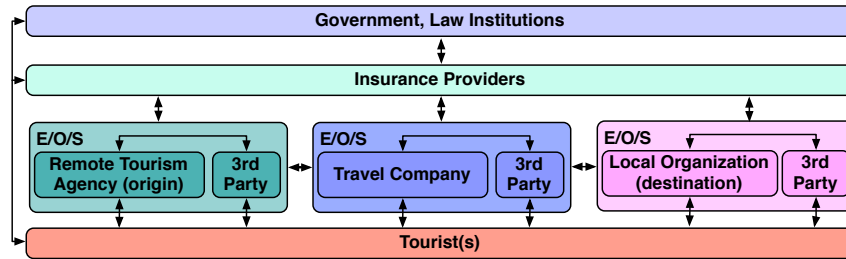
Fig. 3. Classes of the entities subject to trust evaluation.

BnB hosts, rentals [10, 15, 26], government institutions, and law-regulators [13]). In the case of healthcare/medical tourism - patients and care-providers [18]. Aligned with such an approach, Onder et al. [9] classify the users in: *(i)* novel consumers (tourists making their decisions based on online reviews), *(ii)* transfer partners who have no previous business relationships, and *(iii)* small tour operators vs. online travel agencies. Dudin et al. [19] increase the end-user granularity classifying user in *(i)* among those who live in this region, *(ii)* tourists coming from another country region and *(iii)* foreign tourists. Hoang et al. [33] add insurance providers as a layer on top of these entities. Tackmann et al. [17] consider also third parties involved in different points of the tourism chain. Moreover, they invite to consider the customer not only as the final beneficiary of a given good/activity but also as a potential provider: in the case a re-sell (possibly deregulated) takes place. Concerning more technical analysis, Xu et al. [16] discuss the involvement of owners, users and related privacy, physical properties, in the technological drive blockchain compliant. Hawlitschek et al. [2] produced an analysis of trust in peers, trust in platforms, and trust in other targets (including products):

The **Trust in peers** is intended as the trust between consumers and providers. It is a central element and main enabler of many sharing economy business models (e.g., the Airbnb scenario is possible only when hosts and guests trust each other). From the *consumer perspective*, the **trust in providers** is typically captured by a complex trust-scale (e.g, how trustworthy can a host be by combining the feeling generated by the profile picture and the obtained feedback). From the *provider perspective*, it can be conceptualised as a reflective construct covering trusting beliefs towards the host. Investigating car owners attitude in a peer-to-peer car-sharing vehicle provision, the results highlight a lack of trust in others with regard to their personal belongings [2]. The **Trust in the platform** can be interpreted as the beliefs towards the performance of an institution or organisation rather than an individual. It has been hypothesised that trust in the platform is a direct antecedent of the intention to participate in the sharing economy. The authors suggested to measure trust as the belief that a platform is honest, reliable, and competent. From the *consumer perspective*, it is important to conceptualise the trust in two distinct constructs: the guests trust in the host and in the platform (e.g., distinguishing between trust in the platform provider such as Couchsurfing and trust in accommodation providers). In [2], the authors also note the transfer of the trust from the platform to the peers(e.g., trust in the Airbnb platform positively affects the trust in hosts, given a certain fit of the user, platform, and host characteristics). From the *provider perspective*, it has been validated that the trust in the platform also drives trust in renters.

SRQ5 examines features and functionality that the BCT provides or that are expected from the BCT in tourism systems. Some authors state that security, reliability, transparency, immutability, and privacy can change radically the options and their perception in the tourism market [23, 11].
Authenticity of the data and privacy of the users can be provided by encrypting and signing the blockchain transactions [28, 9]. In [16], the authors propose privacy respecting blockchain based sharing economy platform with the following basic operations: generating agreements, making payments, and (in the future) make cancellations.
The renting agreement (generated by the owner) and payment (generated by the user) are not linked with each other directly on the blockchain. Instead, they are submitted to corresponding pools first. Two temporary agents pull out corresponding records and commit to the blockchain again in a new form. Although the new agreement and payment are connected on the blockchain, the adversary cannot learn the relationship between original ones (preserving the privacy). Pilkington et al. in [18] discuss the use of blockchain technology to enhance medical tourism, by providing trust and transparency. To do so, different it can be used: digital signature, hash functions, public key cryptography, and syncing algorithms to allow the exchange of data off-chain [18]. BCT can be beneficial for reliability and quality of existing service [1] and can enable a broad set of new services (e.g., new mobile apps for cash-back, points, and discounts in marketing loyalty systems [34]). Payments and cash-back can generate controversial situations which in BCT-enable systems can be easily settled [2]. Dogru et al. [11] proposed *(i)* instant update of hotels regarding whereabouts of hotel guests, *(ii)* buy, sell, exchange loyalty points, *(iii)* store information (ID, birth certificates, driver's licenses, social security numbers, passports) on platform; give permission to access, *(iv)* automatic recording and sharing of all transactions and automatic procession of contractual terms, *(v)* execution of franchise agreements and managements contracts, *(vi)* assignment of hotel rooms to guests and use of digital key, and *(vii)* automatic execution of payments if flight is delayed or cancelled. Zhang et al. [12] presents the concept of TravelToken: The data are stored on blockchain according to the user-name and travel data (travel destination and value). The employee receives a ticket as a QR code (TravelToken), that includes all travel data required for the whole travel. As the user submits the data, the program retrieves the travellers name and customer number from the smart contract to verify that the customer data are appropriately stored in the smart contract. If the travel method is cancelled, the value is automatically compensated back to the client. If the travel is completed, the smart contracts calculate and compensate the allowances. Moreover, Robinson et al. [25] mention the use of tokens for biometric-enabled single passenger information. Tackmann [17] uses digital signatures to protect all transactions, and allows users to manage, sell, and use concerts' tickets via smartphone. The most relevant functionality of the chaincode (based on Hyperledger Fabric) is tracking the owner and the state of each ticket. In [26], the blockchain technology is used to share and rent private belongings. The users are identified with related Ethereum public key. Therefore, who owns a corresponding private key can use the application (no sign up or additional information are required). Employing Ethereum, all the details of the rental agreement are executed as specified in the smart contract, thus avoiding the need for TTP. Akmeemana et al. [24] propose to use BCT to solve the overbooking practice,

supporting the airport collaborative decision making (ACDM), flight planning and air traffic control charges, maintenance/repair/overhaul (MRO) - (e.g. BC4A industry), and hotel booking for flight crews. Concerning the luggage loss rates, historically (according to SITA) is 5.73 bags per 1,000 passengers for a total of 21.6 million cases. The passengers are unable to track their luggage after the check-in. The arrival is the only moment in which the passengers can realises if a problem occurred. Possible scenarios are *(i)* stolen bags, *(ii)* damaged items, and *(iii)* bags delayed or sent to a wrong destination. In a possible blockchain-enabled scenario, a bag could be monitored in several key-points updating the record in the ledger. In case of a damage occurred, smart contracts could be written to automatically trigger compensation pay-outs.

SRQ6 deals with the strengths as well as limitations of the BCT employment in tourism-related systems. To begin, the strengths identified by the authors are summarised. A list of the limitations will follow in a second step. It is broadly agreed on that blockchain technology is able to replace centralised organisations structures while still ensuring trust and safety related issues. Safety concerns include not only the reliability that changes can only be undertaken when the whole network agrees but also the protection of data regarding the privacy of the user [18, 15]. This leads to a higher quality of services which allows a higher satisfaction [11]. Moreover, the replacement of the middleman allows to reduce additional transaction costs and improve the operational efficiency all in once [17, 23]. A reduction of costs and improvement of efficiency is furthermore reached by the automation of processes based on smart contracts [24]. Whereas there are various advantages of the employment of BCT, many authors agree that the technology finds itself still in a very early phase with challenges ahead [28, 9]. In the context of the airline use-cases, an identified challenge lies in the lower transaction speed due to the higher processing power required. In a centralised system with todays standards compared to an equivalent blockchain solution, the number of transactions of the latter will be outperformed by the former [24]. Additionally, the benefits and the effectiveness of the implementation of blockchain still depends on the industry and sector. Moreover, currently, standardisation is mostly missing [30, 22].

The last question, **SRQ7**, finally proposes the future challenges. As already identified as a limitation by several authors, the lack of concrete applications claim the implementation as implicit challenge. Only by testing, yet unknown implications can be discovered [10, 14, 12, 13, 15]. Regarding the implementation, there are also legal aspects that need to be taken into account [13]. Finally, others argue that there is also still plenty of space for further theoretical and methodological research [9, 2].

4   Discussion

In bot 2016 and 2018, *the world economic forum* and *Gartner* identified blockchain as one of the "top 10 emerging technologies" of the year. An observed rising interest in tourism and the booming of scientific work in that field seems therefore only logical.

Research community vs. industry
Contrary to the activity identified in the academic community, several authors claimed that the missing implementation of blockchain solutions is among the main future challenges. Data-based support for this argument can be found in [20], that analysed a data set of 1140 start-ups using blockchain technology as part of their business models

in 2016. The start-ups included in the analysis span across diverse industry branches (e.g., education, health-care, and tourism). Unlike the identification of 483 young businesses in the finance and insurance sector, the analysis counts only three start-ups in the tourism sector. In 2018, a study [20], sheds, however, a different light on the perspective when briefly analysing the blockchain market in the field of tourism. Firstly, the authors differentiate between applications improving already existing market loyalty systems vs. applications based on new ideas for services in the systems. Then, the authors listed 38 Apps grouped by reference in the following scenarios: accommodations, outdoor industry, catering, transport and "general". The list includes apps such as "Winding Tree"[4]. It is a decentralised travel ecosystem based on the idea of building a public blockchain for the travel market. On the one hand, the goal is to make travelling more affordable for the travellers. On the other hand, the start-up aims to increase the profit for the suppliers by replacing OTAs and thereby challenging their monopoly in the market. Thus, the application correlates directly the possibilities for the implementation of blockchain in tourism suggested in [9]. Another solution regarding the hotel industry is named "Lockchain"[5]. An alpha version of the marketplace allows customers to book rooms directly with hotels for a small fee (or without if paying with LOC tokens) [34]. The aim is to bypass travel agencies minimise extra costs. Therefore, multiple applications have already implemented some of the solutions proposed at a conceptual level.

The lack of understanding as barrier
It does not mean, however, that there is no need for pushing theoretical analysis towards actual development and testing. According to Akmeemana [24], there still is a lack of understanding in which cases blockchain solutions lead to actual improvements. The claim is that a lack of expertise hinders the implementation of further solutions due to the cost of expertise and resources.

Customer advantage vs. supplier advantage
The high costs combined with required expertise, lead to a further discussion. SRQ3 identified one of the most important factor motivating the use BCT: both service providers and suppliers can benefits from BCT-based systems.Two existing examples of already implemented applications are WindingTree and Lockchain. The positive impact from the perspective of the supplier is: "by replacing the intermediary, the company will profit from saving costs and overcoming inefficiencies". The profit is thereby expected to be higher than the required investments. From a customer point of view, the benefits are less clear on a first sight. The replacement of the intermediary does not automatically promise that the prices for the customers will be reduced, especially bearing in mind the high input costs. On a second sight, it has to be accounted for other important but less visible advantages for the customer, what is gained due to the introduction of BCT. As analysed in SRQ6 the elimination of a third party implies that a system relying on trust-based BCT promises a higher level of security for private data. Thus, especially if trust has been identified as one of the highlighting requirements as well as benefits, improvement can also be expected from the standpoint of the customer.

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[4] https://windingtree.com/
[5] https://alpha.locktrip.com/hotels

5 Conclusions

This paper presented an SLR of 29 primary studies addressing BCT in tourism systems. An overview of domains, functionalities, application scenarios, motivations, assumptions, element of trust, strengths, limitations, and identified future challenges has been provided. It has also been discussed hype and reality, the perception of BCT from tourism researchers and industry perspective, the lack of understanding as a factor hampering this technology, and the advantages for the users in turn. However, it has also been acknowledged that to successfully employ BCT and takes advantage from its added-value, the data security and privacy, and scalability, (among others) have to be guaranteed. BCT itself does not guarantee them, therefore, more research/building new mechanisms on top has to be studied and applied to real-word use-cases. Proved the interest of different communities in the tourism-related areas, it confirms the potential of BCT in tourism. Ongoing works focus on addressing open challenges of employing BCT in tourism scenarios. Future work focus on implementing the visionary designs.

References

1. Clare Inkson and Lynn Minnaert. *Tourism management: An introduction*. 2018.
2. Florian Hawlitschek, Benedikt Notheisen, and Timm Teubner. The limits of trust-free systems: A literature review on blockchain technology and trust in the sharing economy. *Electronic Commerce Research and Applications*, 29:50–63, 2018.
3. Christoph Mittendorf. What trust means in the sharing economy: A provider perspective on airbnb. com. 2016.
4. Davide Calvaresi, Alevtina Dubovitskaya, Jean Paul Calbimonte, Kuldar Taveter, and Michael Schumacher. Multi-agent systems and blockchain: Results from a systematic literature review. *Proceedings of the 16th International Conference on Practical Applications of Agents and Multi-Agent Systems*, 2018.
5. Davide Calvaresi, Kevin Appoggetti, Luca Lustrissimini, Mauro Marinoni, Paolo Sernani, Aldo Franco Dragoni, and Michael Schumacher. Multi-agent systems negotiation protocols for cyber-physical systems: Results from a systematic literature review. In *Proceedings of ICAART*, 2018.
6. B. Kitchenham, O. Pearl Brereton, D. Budgen, M. Turner, J. Bailey, and S. Linkman. Systematic literature reviews in software engineering - a systematic literature review. *Information and Software Technology*, 51(1):7–15, 2009.
7. D. Calvaresi, D. Cesarini, P. Sernani, M. Marinoni, A.F. Dragoni, and A. Sturm. Exploring the ambient assisted living domain: a systematic review. *Journal of Ambient Intelligence and Humanized Computing*, pages 1–19, 2016.
8. B.A. Kitchenham, P. Brereton, M. Turner, M.K. Niazi, S. Linkman, R. Pretorius, and D. Budgen. Refining the systematic literature review process-two participant-observer case studies. *Empirical Software Engineering*, 15(6):618–653, 2010.
9. Irem Önder and Horst Treiblmaier. Blockchain and tourism: Three research propositions. *Annals of Tourism Research*, 2018.
10. Md Nazmul Islam and Sandip Kundu. Preserving iot privacy in sharing economy via smart contract. In *Internet-of-Things Design and Implementation (IoTDI), 2018 IEEE/ACM Third International Conference on*, pages 296–297. IEEE, 2018.
11. Tarik Dogru, Makarand Mody, and Christie Leonardi. Blockchain technology & its implications for the hospitality industry. 2018.

12. Anni Karinsalo and Kimmo Halunen. Smart contracts for a mobility-as-a-service ecosystem. In *2018 IEEE International Conference on Software Quality, Reliability and Security Companion (QRS-C)*, pages 135–138. IEEE, 2018.

13. Clare Sullivan and Eric Burger. E-residency and blockchain. *Computer Law & Security Review*, 33(4):470–481, 2017.

14. Rituparna Bhattacharya, Martin White, and Natalia Beloff. A blockchain based peer-to-peer framework for exchanging leftover foreign currency. In *Computing Conference, 2017*, 2017.

15. Ning Zhang, Shan Zhong, and Li Tian. Using blockchain to protect personal privacy in the scenario of online taxi-hailing. *International Journal of Computers, Communications & Control*, 12(6), 2017.

16. Lei Xu, Nolan Shah, Lin Chen, Nour Diallo, Zhimin Gao, Yang Lu, and Weidong Shi. In *Proceedings of the ACM Workshop on Blockchain, Cryptocurrencies and Contracts*, 2017.

17. Björn Tackmann. Secure event tickets on a blockchain. In *Data Privacy Management, Cryptocurrencies and Blockchain Technology*, pages 437–444. 2017.

18. Marc Pilkington. Can blockchain technology help promote new tourism destinations? the example of medical tourism in moldova. 2017.

19. Mihail Nikolaevich Dudin, Diana Dmitrievna Burkaltseva, Svetlana Yurievna Tsohla, Igor Nikolaevich Voronin, Anna Anatolievna Yanovskaya, and Olga Anatolievna Guk. Peculiarities of sustainable tourism development in the russian federation. *Journal of Environmental Management & Tourism*, pages 1559–1566, 2017.

20. M. Friedlmaier, A. Tumasjan, and I. Welpe. Disrupting industries with blockchain: The industry. *Venture Capital Funding, and Regional Distribution of Blockchain Ventures.*, 2016.

21. Chelsea Lam. Applying blockchain technology to online reviews. *LSE Business Review Blog*, 2017.

22. Scholastica Ebarefimia Udegbe. Impact of blockchain technology in enhancing customer loyalty programs in airline business.

23. Wenchi Ying, Suling Jia, and Wenyu Du. Digital enablement of blockchain: Evidence from hna group. *International Journal of Information Management*, 2018.

24. Chami Akmeemana. Blockchain takes off. 2017.

25. Jim Robinson. Passenger terminal development in the digital age. *Journal of Airport Management*, 11(4):355–368, 2017.

26. Andreas Bogner, Mathieu Chanson, and Arne Meeuw. A decentralised sharing app running a smart contract on the ethereum blockchain. In *Proceedings of the 6th International Conference on the Internet of Things*, pages 177–178. ACM, 2016.

27. Sergio Nasarre-Aznar. Collaborative housing and blockchain. *Administration*, 66(2), 2018.

28. Jean-Marc Seigneur. Towards geneva crypto-friendly smart tourism. In *Etats Généraux du Tourisme*, 2018.

29. Martin Zsarnoczky. The digital future of the tourism & hospitality industry. 2018.

30. Jaewon Choi. Modeling the intergrated customer loyalty program on blockchain technology by using credit card.

31. S. Crnojevic and I. Katzela. Chain of points: Transforming loyalty into rewards, 2017.

32. Marc Pilkington, Rodica Crudu, and Lee Gibson Grant. Blockchain and bitcoin as a way to lift a country out of poverty-tourism 2.0 and e-governance in the republic of moldova. *International Journal of Internet Technology and Secured Transactions*, 7(2):115–143, 2017.

33. Hoang Tam Vo, Lenin Mehedy, Mukesh Mohania, and Ermyas Abebe. Blockchain-based data management and analytics for micro-insurance applications. In *Proceedings of the 2017 ACM on Conference on Information and Knowledge Management*. ACM, 2017.

34. Darya Alexandrovna Chakhova and Anna Igorevna Kosheleva. Challenges and perspectives for the development of blockchain tourism in the russian regions (case study of the kaluga region). *Regional economy and management: electronic scientific journal*, (2018-53), 2018.