Blockchain in Tourism – Systematic Review

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Abstract: Contemporary world is experiencing technological changes that are driven by data and its effective use. Cloud computing solutions and blockchain technology are ground-breaking technology. The tourism sector is facing significant challenges, it is necessary to change traditional approaches to tourism management. The aim of the paper is to understand the current knowledge of the role of blockchain in tourism. The paper is based on PRISMA 2020 guidelines for systematic reviews. The review is made up of 15 articles that were selected from the original 76 records that were found in the initial search on the Web of Science. The process is illustrated by a flow chart for systematic reviews. Key identified categories in this review are: customer aspect, technical aspect, legal concern, socio-economic aspect and environmental aspect, however, these aspects are not distributed evenly. Monitoring the interconnectedness of these aspects is a suitable topic for further research. A drawback of the review is that majority of the papers were theory-based and did not provide a real-life scenario. Authors claimed that this technology has the potential to bring many benefits, however, its implementation requires radical changes in companies, legislation and government, as well as the users themselves.

Keywords: blockchain; tourism; systematic review

JEL Classification: C80; Z32

1. Introduction

Given the changes and decline in interest in tourism caused by the COVID-19 pandemic, the time is right to look for new technologies and approaches that could have a positive impact on tourism development today. One such breakthrough technology could be the blockchain, which is known primarily in connection with cryptocurrencies. The aim of this systematic review is to find the possibilities of using blockchain in the tourism sector, the advantages, or risks of implementing this technology and to summarize identified approaches in this area. A blockchain is a socio-economic tool. Blockchain is trendy technology that is gaining more and more potential use in tourism. The tourism sector is facing significant challenges, the enormous amount of travel-related data brings great difficulties to tourism management. Processing the increasing amount of data is demanding both in terms of staffing and finance. It is necessary to develop a strategy how to change traditional approaches in tourism management via the employment of blockchain technology.

2. Methodology

The aim of the paper is to understand the actual current knowledge of the role of blockchain in tourism. As an entry into the research, a review is conducted because it enables

to figure out what the articles deal with, and what categories and aspects are most often researched.

The Paper is based on PRISMA 2020 guidelines for systematic reviews (Page et al., 2021). The search was conducted on 6th April 2022. The articles were selected from the Web of Science (WOS), where the primary criterion was to search for articles where the Topic was stated 'blockchain AND tourism'. Then, records that were not an article or proceedings paper, not in English, not available as Open Access and did not fall into the correct field were discarded. The following fields were selected as correct fields: Social Sciences Other Topics, Business Economics, Computer Science, Science Technology Other Topics, Telecommunications, Government Law, Public Administration, Information Science Library Science, Public Environmental Occupational Health. Due to the number of records and the recent year of release, there was no need to exclude articles due to the year of publication. One of the articles could not be obtained. Despite the applied filter, there was no Open Access and it was not possible to obtain a full paper. In this phase of the process, 18 papers were selected, which were then subjected to a full paper review. In one case the issue only concerned health tourism and not tourism as a whole and in the other two cases, the paper dealt with supply chain management and tourism was mentioned in the article only as one of the areas of potential blockchain technology use.

The search process was worked out by the authors, it was partially automated using Zotero citation software, which enabled the import of results from WOS, identification and automatic download of full papers and then work with citations. Due to the smaller number of articles, it was possible to conduct a full paper review of all the papers and subsequent manual identification of keywords and topics in the articles based on which it was possible to develop the main categories of this issue.

3. Results

According to the search strategy, which is described in the methodology, the review is made up of 15 articles that were selected from the original 76 records that were found after the initial search on the Web of Science. The process is illustrated by a flow chart (Figure 1) for systematic reviews based on PRISMA 2020.

Of the first 76 records, 12 records were discarded due to the wrong document type, 5 records due to the wrong field, 1 record due to an unwanted language, and 39 records that were not Open Access paper. Failed to get 1 record due to the fact that there was no open access paper through the filter. 18 contributions were submitted to the full review procedure, of which 3 were discarded because they did not fall into the given issue. This systematic search thus consists of 15 studies.

Table 1 summarizes basic information on selected studies: author and year of publication, title, number of citations and type of paper. The number of citations (Times Cited) is based on citations on the Web of Science.

Table 2 summarizes the scope and topics discussed in reviewed papers. We distinguished the basic aspects in the articles, that the authors examined. There were papers focused on customer-aspect (papers 1- 4, 9, 11, 13), then technical aspect (papers 2, 4, 6, 9-15),
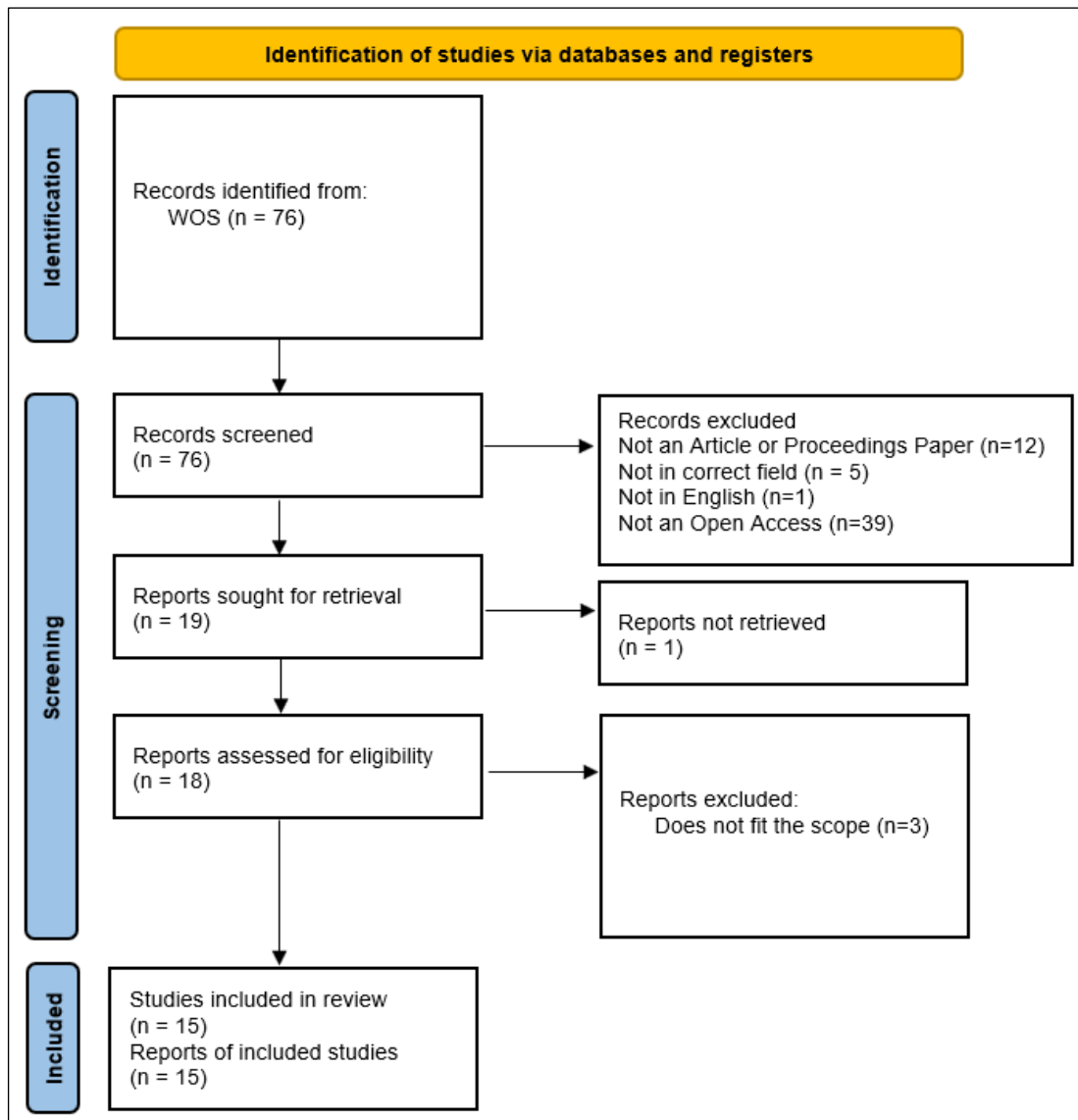
Figure 1. Flow diagram

utilization of concepts or existing applications (papers 1, 3-8, 11, 13-15), legal concerns (papers 1-7, 9, 11, 14) or socio-economic aspect (papers 1-3, 6, 7, 10, 13-15). Then some authors dealt with environmental issues (papers 14, 15) and as for COVID related papers, there were just two out of 15 examined articles (papers 3, 15). In addition, Shrestha et al. (2019) also addressed the need for blockchain applications and environments to be easy to use and to focus on quality. Zhang et al. (2021) were the only ones to deal with app interoperability and the use of the REST API. Veloso et al. (2019) discussed crowd-sourcing platforms and Wei et al. (2020) were the only ones to consider using big data.

There was an interesting article on medical tourism that unfortunately had to be discarded because it didn't fit the scope. (Tyan et al., 2021) The authors provided a comprehensive view of the advantages and disadvantages of their blockchain concept for medical tourism. However, since it is tourism focused primarily on health care, the paper had to be excluded, as this area has a large number of characteristics that are only applied to medical tourism and not tourism as a whole. The other two articles were excluded for a

Table 1. Selected papers

	Author and Year*	Title	Times Cited	Type of paper
1	Tyan et al. (2020)	Blockchain Technology for Smart Tourism Destinations	4	Article
2	Fragniere et al. (2022)	BLOCKCHAIN TECHNOLOGY IN THE TOURISM INDUSTRY: NEW PERSPECTIVES IN SWITZERLAND	1	Article
3	Raluca-Florentina (2022)	The Utility of Blockchain Technology in the Electronic Commerce of Tourism Services: An Exploratory Study on Romanian Consumers	0	Article
4	Zhang et al. (2021)	Interoperable Multi-Blockchain Platform Based on Integrated REST APIs for Reliable Tourism Management	0	Article
5	Melkic & Cavlek (2020)	The impact of blockchain technology on tourism intermediation	1	Article; Proceedings Paper
6	Barreto et al. (2019)	Cryptocurrencies and blockchain in tourism as a strategy to reduce poverty	2	Article
7	Viano et al. (n.d.)	Blockchain tools for socio-economic interactions in local communities	0	Article
8	Veloso et al. (2019)	Distributed Trust & Reputation Models using Blockchain Technologies for Tourism Crowdsourcing Platforms	7	Proceedings Paper
9	Wei et al. (2020)	Research on Construction of a Cloud Platform for Tourism Information Intelligent Service Based on Blockchain Technology	4	Article
10	Filimonau & Naumova (2020)	The blockchain technology and the scope of its application in hospitality operations	21	Article
11	Ahmad & Shah (2021)	MOVING BEYOND THE CRYPTO-CURRENCY SUCCESS OF BLOCKCHAIN: A SYSTEMATIC SURVEY	0	Article
12	Shrestha et al. (2019)	User Acceptance of Usable Blockchain-Based Research Data Sharing System: An Extended TAM-Based Study	7	Proceedings Paper
13	Nuryyev et al. (2020)	Blockchain Technology Adoption Behavior and Sustainability of the Business in Tourism and Hospitality SMEs: An Empirical Study	28	Article
14	Karger et al. (2021)	Blockchain for Smart Mobility-Literature Review and Future Research Agenda	0	Article
15	Benedict (n.d.)	Shared Mobility Intelligence Using Permissioned Blockchains for Smart Cities	0	Article

* n.d. designate early access

similar reason, as they focused exclusively on supply chain and blockchain use without the perspective of tourism. (Sharma et al., n.d.; Varriale et al., 2020)

(Wei et al., 2020) present a design of a comprehensive platform that would meet the requirements of smart tourism and would connect a wide range of stakeholders. It promotes the coordination of tourism management and service and the economic development of destinations that enable the development of a friendly relationship between tourists and community residents. Research is run at consumer and technological levels. Research is based on user behaviour analysis conducted on a series of priority selection rules. The Internet of

Table 2. Scope of selected papers

	Tyan, I. et al.	Fragniere, E. et al.	Raluca-Florentina, T	Zhang, L. et al.	Melkic, S., Cavlek, N	Barreto, I. B. et al.	Viano, C. et al.	Veloso, B. et al.	Wei, C. et al.	Filimonau, V., Naumova, E.	Ahmad, M. S., Shah, S. M.	Shrestha, A. K., Vassileva, J.	Nuryyev, G. et al.	Karger, E. et al.	Benedict, S.
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Costumer	x	x	x	x					x		x		x		
experience	x	x		x					x						
satisfaction			x	x											
trustworthy reviews							x				x				
Technical		x		x		x			x	x	x	x	x	x	x
technology acceptance model												x	x		
cloud platform										x					x
smart contract		x		x		x				x	x	x		x	
Uses	x		x	x	x	x	x	x			x		x	x	x
cryptocurrencies	x		x	x	x	x	x	x			x		x	x	
smart cities	x			x							x			x	x
smart tourism	x			x						x	x	x			
mobility / shareable vehicles														x	x
supply chain					x	x				x					
Legal	x	x	x	x	x	x	x		x		x			x	
privacy concerns	x		x	x	x						x				
interventions / government	x	x				x	x		x					x	
regulation / legislation		x		x										x	
Socio-economic	x	x	x		x	x				x			x	x	x
local communities	x	x	x				x								
poverty					x	x									
sustainability	x				x						x		x	x	x
Environment														x	x
COVID			x												x

Things technology, massive database, cloud computing technology, and scientific analysis, the intelligent tourism application model are applied in the research. (Wei et al., 2020)

Karger et al. (2021) conducted a recent systematic literature review to analyze blockchain's role in mobility and transportation in smart cities. Authors distinguish in the issue the following categories: Technology, Cities and Government, Citizens and tourists, Law, Economy. The category of tourism is partially addressed, however being a part of the global environmental issue and the technical solution, we have not discarded this paper. Authors visualize interdependencies of the use-cases with each other as well as with the environment.

Barreto et al. (2019) research is in the phase of the design and proposal on how to use cryptocurrencies and blockchain technology in economic activities in tourism. To boost tourism business in small merchants depends on government support and the development of suitable infrastructure. Paper doesn´t bring an applied real-world scenario.

Nuryyev et al. (2020) present a study that is based on empirical inquiries about cryptocurrency payment adoption among medium-sized enterprises. Cryptocurrency payment is a new technology disrupting the traditional way of operating tourism and hospitality. The technology acceptance model was adopted. The research was conducted employing a sample of 15,831 people in 101 medium-sized enterprises in Taiwan.

Tyan et al. (2020) discuss the implications of blockchain technology within the smart tourism domain. Again, it is only a scenario of a project waiting to be conducted. The issue is explored from social, economic, political, and environmental aspects.

Fragniere et al. (2022) based their paper on interviews with 18 professionals working in the tourism sector. They state that it is necessary to take into account that blockchain technology is still at a very technical level and therefore it is not accessible to professionals in the tourism sector. According to their research, it is necessary to keep in mind the state interventions and the need for blockchain technology to adapt to the tourism sector and not the other way around. According to their research, state interventions have to be taken into account. Blockchain technology must adapt to the tourism sector and not vice versa.

One of the few studies based on already real technology use is the paper by Viano et al. (n.d.) who talk about their project CommonsHood, which is a wallet app. According to them, it would be possible to solve financing through the wallet app, smaller merchants could use it for a loyalty program and it could also play its role in marketing. They claim that the blockchain can support the sustainability of the local economy. They also discuss digitization in the public sector and introduce the concept of "Government as a Platform". Their application is tested in local urban communing projects.

The paper (Filimonau & Naumova, 2020) discusses the introduction of blockchain technology as ground-breaking because; it disrupts the traditional way of tourism management and hospitality operations. This paper similarly approaches the issue to the Taiwanese study The Blockchain Technology Adoption Behavior and Sustainability of the Business in Tourism and Hospitality SMEs: An Empirical Study (Nuryyev et al., 2020). Implementation of Blockchain technology faces organizational, institutional, and technological challenges, in other words, they discuss organizational, institutional, and technological aspects.

Veloso et al. (2019) also describe online reviews and other tools for building trust and company image in their paper. Their main goal is to compare existing models with a focus on quality and authenticity. They also examine how false information can affect the tourism sector through the concept of crowdsourcing platforms.

Only one article considers the concept of multi-chain (Zhang et al., 2021). The authors are therefore considering more blockchains that would be interconnected so that it is possible to connect all aspects of tourism (accommodation, transport, etc.). They recognize two levels

of data that are used in tourism, namely those that may be public and those that can be considered sensitive to some extent and should therefore remain only in a private blockchain.

An interesting view is also provided by Ahmad and Shah (2021), who, like Veloso et al. (2019) talks about the importance of online reviews and the importance of their accuracy and correctness. They state that in a blockchain-based system, tourists would have a unique identity, so they could write reviews only from one profile that would not be editable.

Transportation is naturally an important part of tourism, even at the destination. Benedict (n.d.) presents a concept of a sharable vehicle. He introduces his concept in connection with the COVID pandemic; tourists are provided with information about the current COVID situation, as well as the current level of air pollution, where information targets people with respiratory problems.

A theory-based paper on an overall assumption by Melkic and Cavlek (2020) contributes to a better understanding of this blockchain phenomenon in tourism and raises the awareness for further research. Technologies reduce organizational and distribution costs, provide a direct real-time approach to end-users, they allow different areas like commerce and booking to be brought into one channel. But the implementation of new technologies depends on the decisions of those responsible. Therefore, it is necessary to be familiar with the issue and understand it.

The last article in this research deals with theoretical research. Shrestha et al. (2019) perceive their contribution mainly in the methodology of their paper, which according to them opens a new direction for the study of distributed ledger technologies and decentralized applications with a focus primarily on users. They emphasize above all the quality and enjoyment of the system, without which it is easily useless.

4. Discussion

Evidence has been summarized regarding current knowledge about the usage of blockchain in tourism and its potential. Blockchain technology has been one of the most discussed topics due to its all opportunities, but also threats. Melkic and Cavlek (2020). Limitations on the number of studies that are taken only from one database. Web of Science database guarantees the quality of published articles however, in other databases, there are numerous articles also of high quality, which were dropped from the search due to the set criteria.

Another drawback is that a majority of the papers were theory-based and not give a real-life scenario, e.g., Wei et al. (2020). As many authors have mentioned, this technology can bring many benefits, however, it encounters a problem with the implementation itself, which requires changes in companies, legislation and government, as well as the users themselves, e.g. Filimonau and Naumova (2020).

Shrier et al. (2016) argue that change which is the contemporary world experiencing is driven by data and its effective use. Cloud computing solutions and blockchain technology are groundbreaking and unique technology enabling storage and securing online authentication of data (Karaszewski et al., 2021). Alenezi et al. (2019) highlight the unlimited possibilities in the development of cloud platforms, operating globally and offering various

services, especially application-based services. Blockchain technology provides not only better data infrastructures and a network authentication mechanism, but it also provides a better quality of delivered services that can be delivered more comprehensively and at considerably lower costs Honar Pajooh et al. (2021). The possibility of universal use of blockchain technology is indisputable as it can have a wide range of applications in tourism. Key identified categories in this review are: customer aspect, technical aspect, legal concern, socio-economic aspect and environmental aspect, however, these aspects are not distributed evenly. Monitoring the interconnectedness of these aspects is a suitable topic for further research.

5. Conclusions

Whether we look at tourism from a global or local point of view, blockchain technology is seen as a promising potential, as evidenced by the research. Blockchain technology delivers solutions that address the huge growth of tourism-related data, the ability to respond and process instantly and systematically manage special arrangements to meet requirements caused by a global threat like a pandemic.

The findings of the studies included in this literature review are promising, despite the limitations described concerning study designs.

Conflict of interest: none

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