Blockchain use possibilities: A systematic literature review

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Abstract. Blockchain and tourism have the potential to become a very advantageous combination, as this technology can provide security and transparency at certain key points. The blockchain can make the transfer and storage of this information easier and more secure, since the responsibility is shared by an entire network. The same goes for payments abroad, which increases the level of trust between all parties. This study aims to make a comparison between these two countries such as Spain and Poland with a significant growth of this technology in tourism. The results of the paper show that blockchain technology is still in an initial phase of its life and that there is a consensus regarding its potential; however, it is still very difficult to know how far it can go and how it will affect tourism.

Keywords: Blockchain, Spain, Poland, Systematic Review.

1 Introduction

In the era of digitization, transactions are carried out over a long distance without the need for personal contact between the parties. In this case, trust in the exchange of information or payment [1], is essential. The development of the Internet [2–4], the Internet services availability [1, 4, 5], and also the increase in digital social competencies [6], translate into a gradually increasing number of available solutions [4], including also for tourism. It also promotes initiatives classified as smart tourism [1, 4, 7, 8]. At the same time, consumers' and entrepreneurs' scale of threats to security and privacy [5, 9] is growing.

Institutions like banks, insurance companies, hospitals, governments, and online intermediaries guarantee people that the promises made will be kept. However, especially in turbulent times, trust in various institutions changes. Economic crises, stock market collapses, epidemics, wars, or inflation can result in sudden changes in the situation, often forcing institutions to change the rules [10]. These changes may lead to a loss of trust in institutions [10, 11]. Due to the deteriorating trust in intermediaries and the costs of servicing such transactions [9, 12], a solution was sought [11], that could

guarantee their security while omitting intermediaries. Solution, which is a form of an electronically confirmed civil contract concluded online [2], the so-called „smart contract" [2, 8, 13–15]. In the tourism industry, an additional reason for looking for a solution to bypass intermediaries [12, 16] is the monopolization of the market by OTA [3, 17–19] and the freedom to use collected guest data by them [20]. As a consequence, OTAs may impose conditions on consumers or entrepreneurs that may be unfavorable to them. This results in a distrust of intermediaries [9, 12] and the need to reduce high brokerage fees [12, 15].

The main goal of this article is to analyze the possibility of using blockchain in the tourism industry context. Analysis was conducted based on content analysis of abstracts of scientific papers and literature research. We want to verify the practical application of blockchain technology in the business practice of tourism enterprises in Spain and Poland. To achieve the assumed goal, the following research questions were posed:

- RQ1: What are the possible applications of blockchain in the tourism industry?
- RQ2: Are there places in Spain and Poland where one can pay for services with cryptocurrencies?
- RQ3: Is there a relationship between the size of the: region's area, region's population or gross domestic product per capita, and the existence of places where cryptocurrency payments are possible?

The paper is organized as follows. Section 2 introduces blockchain issues, its possible use in tourism, and the limitations of implementing blockchain in tourism. Section 3 includes the methodology for data retrieval, while Section 4 presents the findings of the Systematic Literature Review and data and the results of statistical analysis of empirical research. In Section 5, the authors highlight the research's contribution, discuss its limitations, draw conclusions about the results, and propose possible future research avenues.

2 Background

The first and most famous blockchain system is the Bitcoin cryptocurrency [16, 21]. Therefore, blockchain technology is most often associated with cryptocurrencies [12]. Its appearance in 2008, at the time of the greatest economic crisis in the US, gave this technology a strong start [11]. Blockchain, however, is a much broader concept than the cryptocurrencies themselves [15, 18]. This can be described as a decentralized, distributed database system [5, 7, 12, 15, 16, 21] with a high level of security [8, 14, 15, 19, 21], guaranteed by cryptographic algorithms [21] and alleviated the single point of failure problem [5, 18]. Blockchain is compared to an enormous book [12] of records of all operations organized in the form of "blocks" [8, 13, 21]. Records can only be added to it, but they cannot be removed from it, nor can they be modified [7, 21, 22]. Each block is linked to the next block in the chain by the cryptographic hash of the previous block [23]. Each transaction is verified in the system by the consensus of the majority of its participants [19, 21]. Participants confirm the cryptographic compliance of the data [21] and agree on whether the transaction is trustworthy and can be added

as another block in the chain [22] by solving complex cryptographic tasks [23]. The advantage of blockchain technology is that it integrates well with other modern technologies [14]. Blockchain is considered resistant to attacks [17] and less prone to hacking or corruption than centralized systems [5, 24]. As it is a decentralized system maintained by network participants, it belongs to no one [17]. The system also eliminates the necessity of a central institution responsible for transaction verification [5, 22]. The literature currently distinguishes three generations, also known as blockchain eras. These are: blockchain 1.0, i.e., cryptocurrencies, blockchain 2.0, i.e., smart contracts, and blockchain 3.0, i.e., the possibility of user interaction with this technology via smartphones and browsers [5, 22, 25, 26]. Blockchain 4.0 operating in real-time is also being considered [5].

2.1 Obstacles to Blockchain Implementation in Tourism

While blockchain technology could revolutionize many industries, including tourism, numerous obstacles to its successful implementation have been identified in the literature. An often stressed concern is the level of technical complexity [17, 25]. The current knowledge of entrepreneurs, including tourists, about blockchain is low [2, 24, 27]. In the course of qualitative interviews [17] with entrepreneurs, doubts arose that SMEs could keep up with the level of digitization. The more that it is already difficult for them to keep up with technologies in the field of digital marketing [17]. This can deepen the inequalities between SMEs and large corporations. Corporations sometimes implement small blockchain projects for marketing purposes, not affecting the business model. This is to generate interest and reach a new target group [17]. SME owners who do not have the appropriate financial and human resources to be up to date with all technological novelties may also have more significant concerns about implementing blockchain in their businesses [17]. It may also result from the uncertain legal and regulatory status of this technology [22], although more and more countries are investing in blockchain and are gradually introducing regulations regulating it [24]. The indicated barrier is also scalability and speed of operation. Although bitcoin transactions can also be made on bank holidays, on the other hand, they can handle fewer transactions at one time than traditional payments [18]. As [28] notes, bitcoin can also be associated with criminal activity, as it was often referred to as a medium of payment used on the Dark Net.

The indicated barriers include tradition and attachment to a known form of carrying out processes, e.g., booking [17]. Restrictions may also occur in a market dominated by older adults who cannot use blockchain technology. The level of technical complexity aimed at greater transparency may, paradoxically, deepen the sense of information asymmetry [15] of consumer groups with weaker digital competencies. A challenge for blockchain is also the problem of ensuring the privacy of tourists [25]. This applies particularly to sensitive data [15], e.g., in medical tourism. Tourists may be concerned that their data, including sensitive data, is stored in a decentralized network and can be read by anyone who has it. It is also problematic to delete this data at the customer's request [15], because, according to the blockchain assumptions [25], the blocks are non-modifiable and impossible to delete.

One of the most frequently mentioned possibilities of using Blockchain technology in tourism is direct peer-to-peer reservations of tourist services [17, 29], in particular accommodation. This allows you to remove the intermediaries [22] like OTA or banks, who have so far guaranteed the reliability of the concluded contract [29, 30]. However, there are also many doubts on this point. In particular, they relate to the compatibility of technology with older booking systems used in hotels [17]. In addition, it could interfere with using previously used marketing strategies and tools, including OTA, and the problem of accepting reservations directly (at the company's headquarters, by phone, or by e-mail) [17]. The systems would therefore require integration to prevent overbooking from different channels and from favoring customers from blockchain reservations when it occurs. This is related to the necessity to invest in system integration and, thus, again, the dominance of large enterprises: both OTA and hotel chains, which can afford to implement such technologies [17]. The nature of blockchain, as an ownerless system, carries a possible threat in which someone responsible for developing this technology for the needs of the industry will recognize the possibility of its monetization. This would mean that new intermediaries would replace the old intermediaries [17, 31], and the terms of cooperation with them are not possible to estimate at the moment.

The last objection to the use of Blockchain is the high consumption of resources [18]. This applies to cloud spaces because data is impossible to delete. Their growth [32] will consume more and more resources necessary to store data blocks [17]. Increasing technology use entails a more significant energy consumption required for cryptographic verification of a greater number of operations [22, 25, 28, 32]. Following the success of bitcoin, many people started mining new blocks. At that time, there were visible increases in prices and insufficient availability of computer components used for cryptographic calculations necessary for the functioning of the technology.

3 Materials and Methods

A systematic literature review was conducted to answer the research questions posed. The search was made using the Web of Science and Scopus bibliographic database. The time range was limited to 2017 - 2022. Articles and Proceeding Papers in English were searched, for which Topic contained the keyword "blockchain AND tourism". After restriction articles were rejected, 82 papers were obtained. Subsequently, texts for which full texts were not available were rejected thanks to the affiliation of the University of Economics in Katowice. After applying exclusions, 54 publications were subjected to abstract analysis. Ultimately, up to 47 articles were used.

In the second part of the study, the use of cryptocurrencies was empirically verified. The website https://coinmap.org was used. This website contains a database and an interactive map of service points where it is possible to make cryptocurrency payments worldwide. It was decided to compare the results of Spain and Poland. These countries were selected because both are located in the European Union. Spain represents the highly developed countries of Western Europe, and Poland represents the less

developed countries of Central and Eastern Europe. Both countries are large in area (3rd and 8th largest countries wholly located in Europe).

4 Findings

The research results were divided into two parts. The first is the result of a literature review, and its purpose is to answer RQ1. The second part consists of data obtained through an empirical study of coinmap.org, the results of statistical tests using this data, and statistical and demographic information about Spain and Poland.

4.1 Blockchain application possibilities in the tourism industry

Despite the many concerns we have tried to outline above, blockchain technology offers unprecedented opportunities to solve urgent social and economic problems. It is essential to consider whether the chance of solving them is more important than the barriers. And also, consider removing the identified obstacles to successfully apply blockchain technology in tourism.

Payments with the use of cryptocurrencies.

The primary function that can be fulfilled by BCT in tourism, as resulting from the history of BCT, is the possibility of paying with the use of cryptocurrencies [16, 21]. This function is indicated by many researchers in their works [1, 2, 36, 3, 5, 12, 13, 18, 33–35]. This applies to the possibility of paying with cryptocurrencies for purchased services, such as, e.g., car rental or the purchase of travel insurance [19], making a hotel room reservation, or purchasing an air ticket [1, 3, 34, 35, 37, 5, 9, 12, 13, 17, 19, 29, 31]. Cryptocurrencies are a universal currency across borders. When making a payment, the tourist does not have to exchange currencies in different countries he travels to [11] and can make international transactions at no additional cost.

Elimination of the bank's intermediation in transactions.

Making transactions using cryptocurrencies [29, 30] is also not dependent on the bank's working days and hours, especially in the case of different time zones. Online transactions with BCT do not require support from a credit card service provider or payment gateway, reducing transaction costs [19]. Payment can be made in real time, and the availability of the user's funds is confirmed within seconds after placing the order. Using cryptocurrencies in payments also reduces the risk of corruption [13, 18, 19]. Unfortunately, the current cryptocurrency crisis at the time of writing, which has led to a dramatic decline in the value of Bitcoin and other cryptocurrencies, may discourage people from accepting payments in this form. This is because it is associated with the storage of capital in the cryptocurrency market, where the value of their assets may drop by several dozen percentage points within a few days or the need to convert to traditional currency at an unfavorable rate.

Direct booking of tourist services.

Besides the possibility of paying for the reservations made, the BCT technology can also support the reservation system [1, 3, 35, 37, 5, 9, 12, 13, 17, 29, 31, 34]. Whether it concerns accommodation, car rental, or the purchase of airline tickets, it is possible to verify the availability of seats and book available seats quickly. This way, the risk of overbooking is minimized because each booking, i.e., a transaction in the chain, is permanently placed in it. However, to eliminate overbooking completely, there is a need to integrate BCT online booking systems with bookings accepted directly (in person, by phone, or by e-mail).

Elimination of OTA brokerage and commissions.

BCT can be used to eliminate intermediaries and the commission they charge [11] because the guarantee of the availability of the booked service is confirmed in the blocks of the chain. BCT bases its trust on user recommendation systems. If the company offering the service did not exist or did not provide the service, this information would be quickly disclosed in the company's data. The trust function is thus decentralized, and no central intermediaries are needed [1–3, 5, 9, 17, 22, 31, 34, 36]. The possibility of connecting direct tourists and enterprises [19, 29, 30] and concluding their peer-to-peer transactions is increasing [16, 24]. However, the marketing function of the current intermediaries, the recognition of their brands, and their access to the database of potential tourists are invaluable [20]. New platforms that make reservations using BCT take over the marketing role of intermediaries, and there is a risk that they will also want to monetize their activities [17, 31]. Other platforms connect with the existing OTAs, such as TRAVALA with the Booking service.

Verification of tourists' identity.

BCT can assist with identity management and verification [5, 9, 18, 19, 31, 34]. The blocks can store information about the traveler, such as an identity card, driving license, or passport [9]. In this situation, the traveler is not required to carry these documents with him as there would be an exact and secure method of verifying his identity without a physical document. This could prevent the risk of the document being lost or stolen or using false documents. In addition, it is also possible to introduce, thanks to BCT, a solution based on biometric identification [9, 12], which can also successfully replace paper documents. Such verification could reduce the verification time and the queues at the checkpoints [12]. Importantly, the data is stored securely. In the case of a pandemic, as in the case of COVID-19, BCT can assist in verifying vaccination status [23, 38], and verify the certificate's authenticity. At the same time, the anonymity of the person holding the certificate is preserved [39] (e.g., by using biometrics), as well as the security of sensitive data [15].

Asset tracking and sharing.

BCT can support guaranteeing the authenticity of products or services [17] and the security of asset flow. For example, the subsequent transactions saved in BCT may correspond to the next baggage locations in the air transport process [3, 13, 18, 19, 31,

34, 35]. The system based on BCT can check the availability of hotel rooms in real-time and assign a digital room key to a hotel guest [9]. It may also be responsible for the availability of entire facilities, e.g., summer houses, on a similar principle [29, 30].

Control in supply chains.

Thanks to BCT, it is possible to verify the authenticity of a product, e.g., food [1, 7, 40, 8, 9, 11, 14, 28, 29, 31, 35]. Thanks to the verification of a digital certificate that is not modifiable [17], the technology guarantees that the product is original and it is possible to check where it comes from. [7, 35]. Every stage of the production chain [11] and product life cycle can also be certified [14]. It is possible to track each step, manage credentials [17], and even monitor waste [14], especially hazardous waste. BCT allows for traceability, which may reduce the risk of food-borne diseases from other countries [11]. Thanks to BCT, it is possible to control the conditions in which food was stored or transported (e.g., temperature, time) and the compliance of parameters with the requirements [8]. It allows logistic flow control, including the environmental impact of transporting vehicles [14, 28, 41]. Closely following the process makes it possible to tailor better future services [29, 30].

Inventory and warehouse management.

BCT enables inventory management, e.g., verification of the availability of goods in the warehouse [11]. It also allows for controlling orders from suppliers [17, 34]. It can help transfer inventory between points, e.g., restaurants or hotels, as excess is found at one point and missing at another (within one company or network). It can also help you manage your hotel inventory [29], e.g., clean hotel linen and the need to order services such as laundry.

Loyalty programs.

The support in the implementation of loyalty programs is one of the most frequently mentioned possibilities of using the BCT [1, 9, 42, 43, 11, 17, 19, 29–31, 35, 36]. At the same time, it guarantees that a specific consumer takes part in the program. The card for collecting points or the application cannot be transferred to another person. Consumers can collect points saved in an unmodifiable block, and the collected and used points are recorded in the chain as subsequent transactions. Certain cryptocurrency units can be collected to be paid anywhere in a loyalty program. The second option is for companies or destinations to create their own cryptocurrency exchangeable for other products offered by a given company or network.

Promoting sustainable behavior.

By using the loyalty program mechanism and rewards, it is possible to promote sustainable tourism [27]. It is possible to create a reward system for certain behaviors [14, 25, 27, 39, 41], such as saving water and energy in accommodation facilities, cleaning the area of rubbish [25, 41] choosing a bicycle instead of a car [25], or segregating waste that can be recycled [14]. The reward can be a specific unit of any popular

cryptocurrency or your own currency created for the needs of Tourism Destinations [25, 41]. As pointed out by Varriale et al., whole destinations could be involved in global programs, which could thus improve their reputation or work together for a reward [14]. Entrepreneurs could also be rewarded for introducing sustainable solutions and engaging their guests. BCT can also be used for the protection of cultural heritage [32] and wild nature protection [44].

Creating marketing value.

Promoting sustainable solutions in a destination is not the only marketing use of BCT. Thanks to technology, the local community could also access the data [25, 39]. Global action and improved reputation could benefit local communities [39] by increasing interest in the destination. Using data stored in chains, local producers and artisans could reach tourists and offer them their services and goods [25]. The use of BCT may allow for more accurate measurement of tourist traffic and tourists' interest in specific services [1, 45], as well as the exchange of knowledge between various tourist entities [1, 11, 45]. This, in turn, can be used to better serve guests based on preferences based on this data [19] and personalization of services [11, 45], including automated personalization [45]. Because BCT is very innovative, destinations and companies can attract new customers, including those belonging to a specific group of consumers (using BCT or interested in using it). The case of creating your own cryptocurrency can also attract the interest [25] of both consumers and the media.

Reliability of the information.

Because the data in the chain cannot be deleted or modified, BCT guarantees the possibility of verifying the authenticity of, e.g., products [40] or the product's compliance with the description based on opinions. It allows for traceability of other food products [39], along with its production process. Thanks to reliable information, BCT can reduce the problem of information asymmetry [15], which is essential in the tourism industry, where the purchased product cannot be touched and tested beforehand [17]. Raluca-Florentina et al. also propose using BCT as a central database where information about the company's services can be stored. Thanks to this solution, each data update would modify the information in real-time in various places where it is displayed, such as a website, OTA content, etc. [34]. How such a solution works can be compared to PIM (Product Information Management) solutions from e-commerce.

Credible opinions.

BCT allows you to create reliable and inviolable evaluation and review systems [1, 2, 47, 3, 5, 9, 12, 18, 29, 30, 46]. The key function of BCT, which guarantees the reliability of assessments, is that it cannot be modified or removed. Therefore, changing the ex-post review will not be possible [2]. The authors of the opinion can remain anonymous while verifying whether he has used the company's services for which he is writing the review [2]. So it will not be possible to add several reviews for the same property (e.g., negative reviews), nor will it be possible to order positive ratings. The

presence of the guest would have to be confirmed in the company's existing transactions.

Privacy of tourists and data security.

Due to complex cryptographic algorithms, BCT allows for high data privacy and anonymization. Travelers can simultaneously verify their identity, medical details, and financial capacity without revealing their personal information to the staff. This increases the security of sensitive data [15] and reduces privacy concerns [39]. At the same time, it guarantees the truthfulness of data and credentials. It also speeds up the processing of data. It improves the experience of tourists [39], who may feel, for example, embarrassed by the possibility of linking their name to the disease being treated (medical tourism).

4.2 Payments with the use of cryptocurrencies in Spain and Poland in tourism-related services

As established from a literature review, payments are the most obvious use of cryptocurrencies. Among other possibilities, they are also the most widely used. To understand the actual level of cryptocurrency used to pay for services, data from https://coinmap.org/ was used. Trezor Retailer, ATM, Attraction, Cafe, Food, Grocery, Lodging, Nightlife, Shopping, Sports, Transport. The website provides a map of the places that accept Bitcoin divided into categories: Trezor Retailer, ATM, Attraction, Cafe, Food, Grocery, Lodging, Nightlife, Shop-ping, Sports, Transport. This study searched the map for places in the categories Attraction, Cafe, Food and Lodging. The searches were made by regions of Spain and Poland. Then, a statistical analysis of the search results was performed.

Table 1. Data about places where cryptocurrencies can be used in Spain by region

Autonomous	Area (km2)	Population (2020)	GRDP	Attraction	Food	Cafe	Lodging	Sum
Andalusia	87 268	8 464 411	19 107	3	7	4	7	21
Aragon	47 719	1 329 391	28 151	0	2	0	0	2
Asturias	10 604	1 018 784	22 789	0	2	0	2	4
Balearic Islands	4 992	1 171 543	27 682	0	4	3	4	11
Basque Country	7 234	2 220 504	33 223	0	1	1	1	3
Canary Islands	7 447	2 175 952	20 892	1	4	1	14	20
Cantabria	5 321	582 905	23 757	0	0	0	0	0
Castile and León	94 223	2 394 918	24 031	0	2	0	2	4
Castilla–La Mancha	79 463	2 045 221	20 363	0	0	0	0	0
Catalonia	32 114	7 780 479	30 426	2	14	2	5	23
Community of Madrid	8 028	6 779 888	35 041	2	17	3	12	34
Extremadura	41 634	1 063 987	18 469	0	3	0	0	3
Galicia	29 574	2 701 819	23 183	0	2	1	1	4

La Rioja	5 045	319 914	27 225	0	0	0	0	0
Navarre	10 391	661 197	31 389	0	0	0	0	0
Region of Murcia	11 313	1 511 251	21 269	0	1	0	0	1
Valencian Community	23 255	5 057 353	22 426	0	5	2	2	9

Table 1 presents the search results for the number of places where Bitcoin payment is accepted in individual regions of Spain and data on area, population, and GRDP per capita (EUR) in these regions. Analogous data for Poland are presented in Table 2. For the recalculation of GRDP from PLN to EUR, the exchange rate of 4.7 from 17/08/2022 was used.

Table 2. Data about places where cryptocurrencies can be used in Poland by region

Voivodeship	**Area (km2)**	**Popula-tion (2020)**	**GRDP***	**Attraction**	**Food**	**Cafe**	**Lodging**	**Sum**
Greater Poland	29 826	3 500 361	12 020	0	0	0	0	0
Kuyavia-Pomerania	17 972	2 069 273	8 910	0	0	3	2	5
Lesser Poland	15 183	3,413,931	10 058	0	0	1	1	2
Lodzkie	18 219	2 448 713	10 240	0	1	0	0	1
Lower Silesia	19 947	2 898 525	12 176	0	1	1	0	2
Lublin	25 122	2 103 342	7 598	0	0	0	0	0
Lubusz	13 988	1 010 177	9 097	0	0	0	2	2
Masovia	35 558	5 428 031	17 686	0	0	3	2	5
Opole	9412	980 771	8 740	0	1	0	1	2
Subcarpathia	17 846	2 125 901	7 678	0	0	0	0	0
Podlaskie	20 187	1 176 576	7 889	0	0	0	1	1
Pomerania	18 321	2 346 717	10 639	0	1	0	0	1
Silesia	12 333	4 508 078	11 416	0	0	0	0	0
Holy Cross	11 711	1 230 044	7 866	0	0	1	0	1
Warmia-Masuria	24 173	1,420,514	7 725	2	0	0	0	2
West Pomerania	22 897	1 693 219	9 181	0	0	2	1	3

In the analyzed categories in Spain, the largest number of places where it is possible to make payments with Bitcoin belongs to the Food (46% of the examined objects) and Lodging (36% of the investigated facilities) categories. Most places are located in the Community of Madrid and further in the tourist regions of Spain: Catalonia, Andalusia, Canary Islands, and the Balearic Islands.

There are fewer places in Poland where it is possible to pay Bitcoin for services. Most are in the Masovia region (where the country's capital is located) and Kuyavia-Pomerania (the coastal area). In Poland, it is possible to pay for services mainly in objects of the category: Cafe (41% of the examined) and Lodging (37% of the examined).

Table 3. Shapiro-Wilk test results

	Country	**Statistics**	**df**	**Relevance**

Attraction	ES	,571	17	<,001
	PL	,273	16	<,001
Food	ES	,736	17	<,001
	PL	,546	16	<,001
Cafe	ES	,773	17	<,001
	PL	,682	16	<,001
Lodging	ES	,725	17	<,001
	PL	,732	16	<,001

The performed Shapiro-Wilk test showed statistical significance ($p < 0.05$). The data is not normally distributed. Therefore, non-parametric tests were performed. Correlation analysis was performed using the rho-Spearman method. The correlation between Area, Population, and GRDP of regions and places located in regions where it is possible to pay with cryptocurrencies was analyzed.

Table 4. rho-Spearman analysis for Spain

	Spain	Attraction	Food	Cafe	Lodging	Sum
Area	Correlation coefficient	0,138	0,196	-0,105	-0,027	0,109
	Significance (two-sided)	0,596	0,45	0,688	0,919	0,678
	N	17	17	17	17	17
Population	Correlation coefficient	,651**	,716**	,724**	,673**	,753**
	Significance (two-sided)	0,005	0,001	0,001	0,003	<,001
	N	17	17	17	17	17
GRDP	Correlation coefficient	0,018	-0,014	0,145	0,076	0,063
	Significance (two-sided)	0,945	0,958	0,578	0,771	0,81
	N	17	17	17	17	17

** Correlation significant at the level of 0.01 (two-sided).

The correlation analysis of the rho-Spearman pairs of the Area, Population, and GRDP parameters for the objects in the categories Attraction, Food, Cafe, and Lodging in Spain showed that for entities of all types, there is statistical significance in correlation with Population. The results for pairs of features and Area, and GRDP are not statistically significant. In all cases, the correlation is strong and positive.

Table 5. rho-Spearman analysis for Poland

	Poland	Attraction	Food	Cafe	Lodging	Sum
Area	Correlation coefficient	0,252	-0,188	0,117	-0,057	0,065
	Significance (two-sided)	0,346	0,486	0,666	0,833	0,81
	N	16	16	16	16	16
Population	Correlation coefficient	-0,196	0	0,209	-0,251	-0,168
	Significance (two-sided)	0,467	1	0,438	0,348	0,533
	N	16	16	16	16	16
GRDP	Correlation coefficient	-0,308	0,313	0,295	0,095	0,217
	Significance (two-sided)	0,246	0,238	0,267	0,726	0,42
	N	16	16	16	16	16

** Correlation significant at the level of 0.01 (two-sided).

Based on the analysis of the rho-Spearman correlation for Poland, it was found that the results for any of the pairs are not statistically significant.

Table 6. rho-Spearman analysis for Spain and Poland

Spain and Poland		Attraction	Food	Cafe	Lodging	Sum
Area	Correlation coefficient	0,1	0,085	0,007	-0,045	0,118
	Significance (two-sided)	0,581	0,637	0,968	0,803	0,512
	N	33	33	33	33	33
Population	Correlation coefficient	,387*	0,34	,523**	0,33	,399*
	Significance (two-sided)	0,026	0,053	0,002	0,061	0,021
	N	33	33	33	33	33
GRDP	Correlation coefficient	0,166	,569**	0,209	0,286	,347*
	Significance (two-sided)	0,356	<,001	0,244	0,106	0,048
	N	33	33	33	33	33

* Correlation significant at the level of 0.05 (two-sided).

** Correlation significant at the level of 0.01 (two-sided).

The results of the pairwise correlation analysis for all objects in Spain and Poland, between the Area of the region and the facilities of any type, there is no appropriate statistical significance. On the other hand, the results of the correlation of Population - Attraction, Population - Cafe, and GRDP - Food pairs are statistically significant. The correlation result is strongly positive for Population - Cafe and GRDP - Food pairs. There is also a moderately strong relationship between the number of all places where you can pay with cryptocurrencies and Population and GRDP at a significance level of $p < 0.05$ in the pooled analysis of both countries.

5 Discussion and Conclusion

BCT's wide range of possibilities for tourism requires practical implementations and network interconnections of various systems. As noted [37], a single-chain platform is not sufficient. To achieve consistency of information and the possibility of combining tourist services with the use of a customer ID, it is essential to be able to integrate individual services using BCT, as well as to use multi-chain architecture [37]. This can be guaranteed by stable and proven implementations of BCT-based systems. Unfortunately, some projects using BCT described in the literature, such as CoolCousin [37], are no longer continued. This may be evidenced, among other things, by the lack of understanding of how BCT technology could improve the condition of tourism, a small number of users, the lack of financial support, errors in the system functioning, or other detected. In the future, it would be worth analyzing the existing and closed BCT projects and conducting research that will explain the decision to complete the development of these projects.

The results of the statistical analysis of empirical data showed that in Spain, a country better developed economically and technologically than Poland, more enterprises operating in the accommodation, catering, and attractions industries allow customers to pay for services with cryptocurrencies. Payment for attractions is not popular in any of these countries, and the percentage of companies surveyed allowing payment for services is similar for Lodging. In Spain and Poland, the largest number of such places is in the region where the capital of the country is located. The popularity of such places is greater in the tourist regions of both countries. In Spain, a strong positive correlation has been observed between the region's population and the number of places one can pay with Bitcoin. No correlations were observed in Poland, which may be due to the small number of places offering such a possibility. The ability to pay with cryptocurrency is not a popular method in any of these countries.

The limitation of our study was that we only analyzed the results of two countries. It is also impossible to state whether coinmap.org has a complete and up-to-date database of service points where Bitcoin payments can be made. In addition, the coin map service has a database of only those places where Bitcoin payment is possible; it is unknown whether one can pay with other cryptocurrencies.

Future research will be conducted to verify other databases of enterprises and extend to a larger number of countries to increase the credibility of the verified assumptions. Further research should also look at the factors influencing companies' enabling cryptocurrency payments.

Apart from the theoretical contribution of identifying the possibilities of using blockchain in tourism, this study is also of practical importance. It has been shown that despite the great interest in blockchain technology, its implementation in the business practice of companies in the tourism sector in Spain and Poland are insignificant.

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