

Review

Bitcoin Use Cases: A Scoping Review

Emma Apatu ^{1,2,*} and Poornima Goudar ³

¹ Department of Health Research Methods, Evidence and Impact, McMaster University, 1280 Main St. West, Hamilton, ON L8S 4L8, Canada

² Centre for Health Economics and Policy Analysis, McMaster University, 1280 Main St. West, Hamilton, ON L8S 4L8, Canada

³ Faculty of Science, McMaster University, 1280 Main St. West, Hamilton, ON L8S 4L8, Canada

* Correspondence: apatue@mcmaster.ca

Abstract: This scoping review examines individual and societal use cases of Bitcoin in the peer-reviewed literature. Arksey and O'Malley's scoping review methodology was used, and a comprehensive search strategy was employed using Web of Science and Engineering village databases. Articles were screened at the title and abstract and full-text levels by the authors. One author conducted data extraction to summarize the data. In total, 17 relevant articles were included in this review. Investment and savings were the most widely reported use cases at an individual level, with payments and international transfers less frequently reported in the studies. Only two studies reported on societal use cases of legal tender; however, only one country, El Salvador, executed its intention. Our study suggests that Bitcoin is being used by individuals around the world with little report of societal (e.g., country adoption) uses cases. For example, there is evidence on the internet and on a grass-roots level that Bitcoin is being used in circular economies; however, the peer-reviewed literature may not yet capture the extent and full benefits and challenges. As such, we provide ideas for future research to more comprehensively explore Bitcoin uses and its impacts on individuals and society.

Keywords: Bitcoin; bitcoin usage; adoption; review



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1. Introduction

Money is an integral part of society that allows value to be exchanged for goods and services across time and geographical space. Moreover, money, and the financial systems that it operates inform the economic base layer upon which individuals, business, and countries are incentivized to operate, transact, and save for the future. Currently, the prevailing monetary system in the world relies on fiat money that is connected by local and global networks; however, the settlement layers are slow relative to other modern monetary technology, and the production of new monetary units is centrally controlled. Furthermore, the system is also fraught with the prioritization of debt and debasement [1]. The stability of money supply has implications for the extent of income inequality and well-being in a given society [1,2]. Where people face extreme currency debasement, debt, or inflation, individuals and countries might be inclined to use other forms of money as a medium of exchange, store of value, or investment. For example, in September 2021, El Salvador became the first country in the world to adopt Bitcoin as legal tender as a step to improve monetary policy in its borders [3]. Additionally, a previous study showed that Bitcoin as a hedge against inflation revealed mixed findings [4].

Bitcoin, inception in 2008, represents the first truly decentralized, peer-to-peer monetary network and form of money (distinguished in writing by lower case 'bitcoin'). Over the years, both the Bitcoin network and currency have experienced significant growth. Currently, Bitcoin has a market cap of over USD 1 trillion [5]. As such, the Bitcoin monetary network might hold promise in creating a new global financial system that benefits

societies and individuals due to its open monetary system that anyone can join regardless of country affiliation. Furthermore, Bitcoin's monetary policy that includes a hard cap of the number of bitcoins (21,000,000) has a deflationary monetary policy that contrasts with the inflationary system that fiat money is based upon. To date, limited research has examined the use of bitcoin by individuals and societies in the peer-reviewed literature. Previous research has mainly focused on individual's intentions and perceptions of use cryptocurrencies by selecting a priori constructs to predict potential use [6,7]. Additionally, much of the past research on Bitcoin fails to examine it exclusively and commonly includes it with other alternative cryptocurrencies, or pre-emptively labels it as a monetary tool for bad actors, therefore making it difficult to conclude Bitcoin use cases. One study by Andreianova et al., 2021 [8], conducted a large-scale study with Bitcoin users in 2020 and found that its use was varied, ranging from activities such as savings to trading.

While there is a growing body of research on Bitcoin, to the best of our knowledge, there has been no synthesis of the current literature. A synthesis would support the identification of the research gaps and future areas of research. Therefore, the purpose of this scoping review is to provide an up-to-date snapshot of the peer-reviewed literature on the use of bitcoin only and associated findings about how individual people and societies use it.

2. Methods

This scoping review utilized the Arskey and O'Malley framework [9]. Two searches were executed in July 2023, using the Web of Science and Engineering Village databases. These databases were chosen as they capture a wide breadth of the literature in the science, social science, and engineering domains. A librarian from McMaster University collaborated in developing the search strategy, which specifically targeted Bitcoin usage from 2008 to July 2023. Refer to Table 1 for details on the applied search strategy. Search terms included "Bitcoin" and "usage", as well as words such as "perception" and "attitude" to capture studies exploring antecedent and related behaviour related to usage.

Table 1. Search Strategy.

Search	
Search 1 Web of Science	(Topic) and (belief or attitude or perception * or awareness or usage or adoption) ** (Topic) and Article or Proceeding Paper or Review Article or Early Access (Document Types) and English (Languages)
Search 2 Inspec, Engineering Village, GeoBase, GeoRef	Original search2861 Total records for (((((bitcoin) WN ALL) AND ((trust OR attitud OR belief or adoption OR awareness OR perception OR usage) WN ALL))) AND (((ca) OR {ja} OR {pp} OR {cp}) WN DT) AND ((english) WN LA))))), 1666–2023 **

3. Inclusion and Exclusion Criteria

Articles were deemed eligible if the primary aim of the study was to examine bitcoin use at individual or societal levels. Studies that examined bitcoin with other cryptocurrencies (altcoins like Ethereum, etc.) and cryptocurrency networks were excluded. Also, studies focused on Bitcoin mixing, technical aspects, and tumbling services were excluded. Additionally, simulation studies or theoretical studies only studying perceived usage without capture of actual usage were also excluded.

4. Data Extraction

The screening process was conducted using PRISMA methodology. The authors screened title abstracts and conducted a full-text review using Covidence. One reviewer extracted all the data from the included articles using an abstraction sheet that captured (author, publication title, country, year of publication, discipline, study aim, unit of analy-

sis, study design, recruitment methods, population description, inclusion/exclusion and major findings).

5. Results

The database search initially identified 1107 potentially relevant articles. After removing 129 duplicates, 978 unique studies remained. The titles and abstracts of these articles were screened by the authors, after which 70 articles were selected for potential inclusion. The 70 articles were screened for full text, and a further 53 articles were excluded. In total, 17 relevant articles are included in this review (see Figure 1).

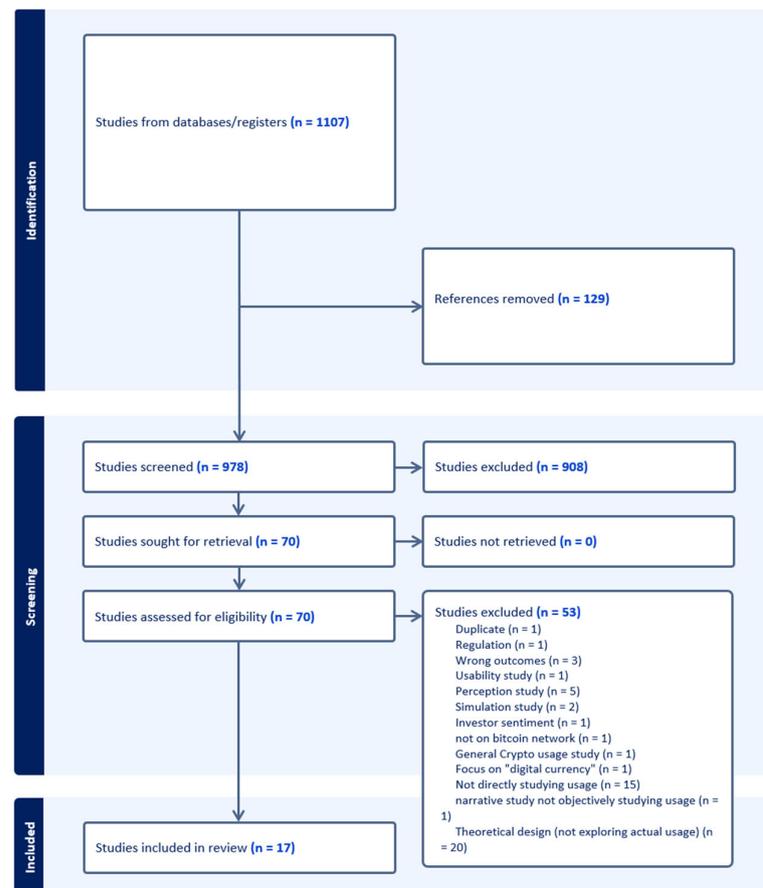


Figure 1. Prisma diagram.

5.1. Article Characteristics

This study identified 17 articles across four unique disciplines (See Table A1 in Appendix A). The number of articles about bitcoin usage has increased significantly in more recent years, with all the included studies being published past 2016. Of the 17 included articles, 6 were published in computer science journals, 5 were published in economics, 4 in business and 2 in information systems journals. It is important to note that some articles had an interdisciplinary focus, making it difficult to precisely categorize the article.

5.2. Geographical Locations of Bitcoin Research

The 17 articles represented 10 different countries. In total, 7 of the 17 studies collected bitcoin usage data in North and Central America, more specifically Canada (n = 4), United States of America (n = 1) and El Salvador (n = 2). Canada had the greatest number of publications surrounding bitcoin usage (n = 4), with Turkey, the United Kingdom and El Salvador following behind with two articles each. The remaining countries referenced can be seen in the Heatmap figure (See Figure 2).

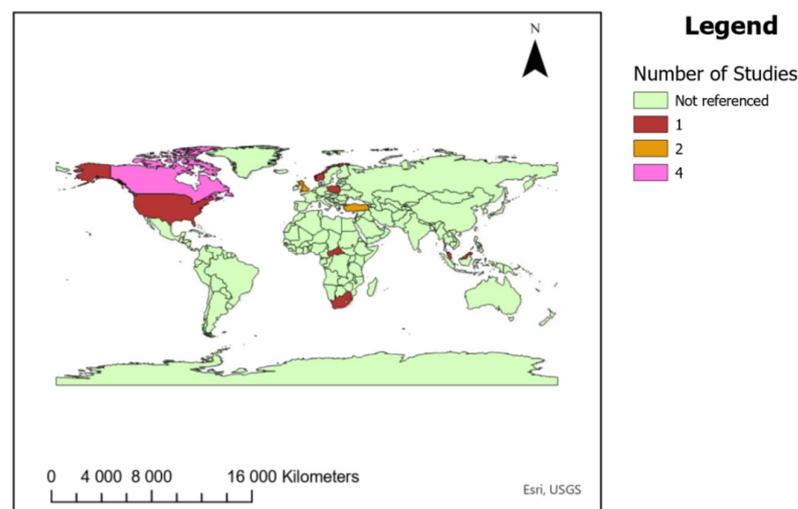


Figure 2. Heat map of studies by country. Note: This map does not include studies where it was hard to pinpoint a location; please see Table A1 in the Appendix A.

5.3. Case Unit Analysis of Bitcoin Research and Study Design

The majority of studies collected used individual case unit analysis (e.g., individual survey responses, one-on-one interviews). Fifteen of the studies selected are individual case unit analysis based and two of studies were societal case unit based [3,10].

Three different study designs were observed from the 17 papers. Of the 17 studies, 11 employed a cross-sectional design, which mainly used a survey method to understand and gauge the individual usage of bitcoin. Three studies employed a usability/case study design [3,10,11], of which two studies [3,10] incorporated the sole instances of societal unit case analysis. The societal unit case analysis observes the use of bitcoin on a larger societal or national setting. These two societal studies reported the use of bitcoin as a legal tender on a national level in El Salvador and Central African Republic [3,10]. The remaining usability study examines the implementation of bitcoin use in a point-of-sale environment, specifically in a Montreal Café [11]. In this setting, customers were exposed to the practical use of bitcoin to purchase items, gaining interest with their experience. The remaining four studies employed a qualitative design, primarily using an interview style to descriptively gauge usage habits of Bitcoin users [12–15].

5.4. Recruitment Findings

Similar recruitment methods were used in the majority of these articles. Predominantly, studies used a questionnaire survey to recruit participants and capture data. A mixture of in-person and online recruitment was conducted, with various sources of online forums being used.

In South Africa, virtual communities like cryptocurrency forums and Bitcoin-related social media pages were targeted for online questionnaires via Google Forms [16]. In Sas and Khairuddin's 2017 study, recruitment involved both public and private invitations to active members on Facebook and Telegram, incentivized by a GBP 10 reward. Similarly, in Oslo, participants were sourced from Bitcoin Meet-Up groups, Forex brokers, and a university college through Survey Monkey [17]. Additionally, Bitcoin users were recruited from Bitcointalk and Reddit, while non-users were reached through university campus flyers and online platforms like Craigslist [14]. This recruitment process also involved assessing participants' knowledge levels. Similarly, the Adreianova et al. study sent out survey invitations to members of LocalBitcoin, a peer-to-peer bitcoin marketplace website [8]. The Piotrowska 2017 study used Polish websites, including forums, blogs, news services, and social media for survey invitations [18]. In some cases, existing surveys were adapted, such as one taken from Blockchain Capital's 2017 Bitcoin research at Erzincan Binali Yıldırım University [19]. Lastly, the Canadian studies used the Bitcoin Omnibus Survey along with

opt-in panels and internet recruitment through website advertisements, offering rewards for survey participation [20–22].

5.5. Usage Findings

5.5.1. Characteristics of Ownership and Holdings

The predominant demographic that holds bitcoin is young males with a university-level education. Throughout all the retrieved studies, there are fewer female participants and less reported bitcoin use. In the Henry et al. 2019 Canadian study, the 18–24 age cohort exhibited the most growth in ownership, as bitcoin holdings increased from 6% to 14%. The distribution of ownership across the study displayed variability, with 32% of participants possessing less than 0.1 BTC in 2016, and 34% maintaining holdings below 0.05 BTC in 2017 [21]. In the Balutel et al. 2023 study, survey results revealed that bitcoin ownership remained stable from 2018 to 2020. When acquiring bitcoins, web and mobile exchanges are the most favored methods [22]. In the Presthus et al. study [17], it was found that seven participants owned 1 or fewer bitcoins, six participants owned between 2 and 99 bitcoins, two participants owned 100 and 180 bitcoins, respectively, and one participant held a considerably larger number of 850 bitcoins.

5.5.2. Investments

Participants reported diverse patterns of Bitcoin usage; however, 9 out of 17 studies stated that investments and savings were the most common use of bitcoin. More specifically, participants in the Jankeepsad 2022 study [16] (43%) primarily utilized Bitcoin as an investment opportunity, while the majority (57%) considered it a speculative instrument for profit making. Despite 98% of participants being aware of Bitcoin's payment option, only a small fraction used it for transactions. The Sas and Khairuddin study had a smaller participant pool but documented similar results (2017). In total, 13 out of 20 individuals utilized bitcoin as an investment tool, either occasionally ($n = 8$) or full time ($n = 5$). Only three participants utilized bitcoin for everyday transactions and payments as we also noticed in the 2022 Jankeepsad study [16]. Investments and monetary gain were the only cited reasons for using Bitcoin by the participants in the 2017 Presthus study. Participants in the Sas and Khairuddin study used Bitcoin for international transactions and investments. Additionally, the 2022 Uymaz and Esmen study [15] solely focused on Bitcoin miners where all participants utilized bitcoin as an investment tool. In total, 6 out of 13 participants solely used it for investment, and 7 out of 13 used it for payments and investments. The Henry et al., Huynh et al., and Balutel et al. studies [21] all focused on participants in Canada from the years 2017, 2018, and 2019, respectively. Findings from these studies indicated that in 2017, Bitcoin ownership shifted towards investment (58%); in 2018, the frequency of using bitcoin for goods and services slightly increased; however, in 2019, investments were still the majority use case for bitcoin. Lastly, the Andreianova et al. [8] study found that 3212 respondents or 24.5% of their total survey responses buy bitcoin for investment purposes, as many users expect the price to rise, supporting their long-term investment. It was also found that 13,717 respondents buy and sell bitcoin for trading purposes as extra income. Over half of the traders complete at least one trade a month, while about one-third trades weekly or even daily.

5.5.3. International Transfers

Beyond investments, sending money internationally was a recurrent theme among participants across these studies [12–14,18]. Andreianova et al. [8] found that 9.7% or 5206 respondents use bitcoin for remittance and cited it as the second most common option after traditional bank transfers. It was found that Latin America displays the highest rates of remittance usage using bitcoin. The Sas et al. and Khairuddin et al. studies [12] included participants explicitly mentioning the ease, efficiency, and reduced costs of sending money internationally.

5.5.4. Everyday Transactions

Bitcoin users are aware of the potential payment options with bitcoin; however, there is limited usage for everyday transactions. The Sas and Khairuddin study interviewed 20 bitcoin users, and only 3 users utilize bitcoin for everyday transactions. Feedback from some of the bitcoin users in the study seemed to perceive Bitcoin as more of an investment. In the Gao et al. 2016 study, out of ten bitcoin users, five reported using Bitcoin daily, two twice a month, and three infrequently. In the 2017 Andreianova study, 35% of the LocalBitcoin userbase uses bitcoin to purchase goods and services, and their survey results show that 7479 respondents list payments as their primary purpose for using bitcoin. In addition, 1229 respondents (2.3% of total) said that they use bitcoin to pay for work and services due to PayPal being banned in certain places, whereas Bitcoin works everywhere. Lastly, in the 2022 Karabulut study, 7 out of 13 Bitcoin miners utilize Bitcoin as a payment method in addition to an investment tool.

5.5.5. Businesses and Bitcoin

The acceptance of Bitcoin by Amazon and Overstock was viewed as a significant signal of its potential as a future financial instrument, explicitly mentioned by participants in the Khairuddin et al. and Gao et al. studies [13,14]. Additionally, the Eskandari et al. 2016 study [11] implements a Bitcoin POS system in a Montreal Cafe and observes the resulting usage and perception. It was found that customer interest grew through Bitcoin POS usage.

5.5.6. Limited Usage for Donations

The 2019 Zhauniarovich et al. study solely analyzed bitcoin donations to Github repositories. Use cases for donations were found to be limited, with only 44 thousand deposits totaling USD 8.3 million in the last 10 years, indicating a weak correlation between Bitcoin usage and repository popularity [23].

5.5.7. Societal Use Case

Of the 17 studies, only 2 investigated the implementation of Bitcoin on a national societal level, specifically in El Salvador and the Central African Republic. The Kshetri study [10] solely focused on the use of Bitcoin in El Salvador; approximately 91.7% of businesses reported a limited impact from Bitcoin usage due to low trust and minimal adoption for transactions. Only 14% of respondents reported using bitcoin for business transactions, and remittances accounted for less than 0.01% of debt payments. Kshetri [10] found similar results; Bitcoin accessibility and usability issues frustrated consumers and vendors.

6. Discussion

Overview

Based on the findings of our review, there has been a growth of research on the use of bitcoin since 2016 that mostly examines individual uses as an investment, savings, a way to transact online and at business point of sale and send money globally, as well as means for donations. We expect that the peer-reviewed literature on bitcoin usage will continue to increase over time as adoption continues. While this scoping review did not focus on Bitcoin mining, one study [15] in Turkey highlighted that mining was conducted by a sample of individuals as a means of entrepreneurship. Mining is a very important part of the Bitcoin network that helps to secure the Bitcoin blockchain through a Proof-of-Work mechanism. Power of Work requires energy expenditure that has a cost; therefore, miners are incentivized to find cheap energy sources. Not only is Bitcoin mining a way to generate income, it is encouraging new research to help stabilize energy grids. For example, Hallinan et al. [24] describe that Bitcoin mining can be used to support "Productive Use of Energy" defined as "a means to add value to solar energy mini- and micro-grids to ensure investment worthiness and add more value to the communities being served." Pilot cases are being run in areas in Ghana, Liberia, Afghanistan and the United States [24]. Regarding

societal use cases, there are only a small number of studies that report on societal adoption, with only El Salvador (2021) and the Central Africa Republic (April, 2022) announcing legal tender laws. Unfortunately, the CAR in 2023 had to remove its law. It is suggested that due to economic and internet challenges, CAR had to reverse its decision [25].

Most of the studies in the review were found within the computer science, economics, business, and information systems disciplines. Given the technical nature and direct relevance of Bitcoin to the fields, it makes sense why studies were found in these types of journals. However, study of the social impacts of Bitcoin uses on the individual and society in other disciplines would be helpful to determine the degree to which a new type of money can improve areas of areas of life such as education, well-being, and community outcomes. For example, researchers and communities could explore the degree to which use of bitcoin impacts the health of an individual or whether the use of bitcoin can improve a community's ability to crowdfund for needed community goods and services. Also, most of the studies used cross-sectional, useability, qualitative, and case study designs. While these types of study designs are useful for gathering point prevalence estimates of usage characteristics and in-depth perceptions of technical, economic, benefits, and challenges, they miss exploration of in-depth contextual factors and insight into theoretical understanding. Additionally, there was a larger number of reported studies in Western countries (Canada, US, and UK), with fewer from other regions of the world like Africa, Asia, South America, and Europe. Studies also relied on the recruitment of participants from online forums, MeetUps, and institutes of higher education, which mostly highlighted use among men. While recruiting from such environments has its advantages where the researcher can more easily target participants of interest that have familiarity with Bitcoin, they can severely limit the breadth of participants and findings. For example, in the field of psychology, there are criticisms about how reliant the field is in drawing its participants from a narrow pool of Western, educated, industrialized, and democratic societies [26], which limits the diversity of information gathered. As such, researchers of Bitcoin should consider expanding their reach of participants to co-create and engage in relevant research.

7. Strengths and Limitation of Review

To our knowledge this review is one of the first to summarize bitcoin usage in the peer reviewed literature. While a detailed search strategy was used, our findings represent a snapshot of research. We could have missed relevant peer-reviewed and gray literature given the rapidly evolving body of research. As such, this scoping review may have underreported findings on bitcoin's use. Also, our review was limited to English articles and, therefore, could have missed the relevant literature that was published in other languages. Additionally, we excluded studies that explored darknet use of bitcoin and, therefore, there could be a degree of nefarious uses of Bitcoin. However, with every new technology that is created, there is a chance for illicit use cases.

8. Implications for Future Research

Findings from this review provide direction for future research in four areas: (1) Utilization of case study descriptions and mixed-method study designs to highlight how bitcoin is being used at the community level since individual usage is not solely a personal endeavor, but is used in value exchange with peers to obtain goods and services. There are currently several circular economies (see <https://fbce.io/> accessed on 21 December 2023) that are using Bitcoin for such purposes and are in regions throughout the world including places where traditional banking services and research coverage is often limited. Furthermore, El Salvador presents a unique case of societal adoption; therefore, future research should objectively explore the impacts of bitcoin usage within its communities. Such evidence would help to inform other countries' policies around Bitcoin adoption. Additionally, new research could aim to describe the facilitators of and barriers to adoption. This might include best practices in Bitcoin education, payment and custody solutions, methods for seed funding, and the outcomes of bitcoin usage within these communities. (2) Systematic

reviews with the use of Artificial Intelligence could become more commonplace and provide more timely evidence from the rapidly growing field of bitcoin usage. (3) Studies on usage patterns among women and other socioeconomic demographics to examine bitcoin adoption trends. If Bitcoin continues to establish itself as a viable monetary system, ownership of bitcoin by as many people around the world as possible could help minimize poverty gaps, but because it is a new system, there would need to be identification of the social and technical gaps to adoption and educational outreach. (4) Theoretical and conceptual papers are needed to examine the social implications of Bitcoin on things such as health and wellbeing since money is an important determinant for these aspects of life.

9. Conclusions

This scoping review summarizes and synthesizes research on bitcoin uses on individual and societal levels. The current literature shows that bitcoin is being used for non-nefarious purposes like investment and savings. Studies found in this review are limited to a small number of geographic regions primarily in the West. Given that we are moving to a future that is more digital, it is imperative that future research expands on the exploration of Bitcoin use cases around the world and on the many facets of life that money impacts.

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Conflicts of Interest: The authors declare no conflict of interest.

Appendix A

Table A1. Summary of bitcoin usage.

Study	Countries	Study Aim	Unit Case Analysis	Study Design	Population Description	Inclusion/Exclusion	Major Findings
Kshetri 2022 [10]	El Salvador, Central African Republic	Suitability of adoption of Bitcoin as legal tender in CAR and El Salvador or Bitcoin as legal tender analysis	Societal	Useability	Population in El Salvador; Central African Republic	Not Applicable	Bitcoin accessibility and useability issues frustrate consumers and vendors
Jankeepsad 2022 [16]	South Africa	Factors influencing Bitcoin adoption in South Africa	Individual	Cross-sectional	204 respondents; South Africa; 161 male respondents; 43 female respondents; 18–25 years (55 respondents), 26–40 years (98 respondents), 41–50 years (27 respondents), 50+ years (24 respondents); Varying education levels: (Primary, Secondary, Tertiary); Various levels of income: (Ranges between ZAR < 10,000 and >ZAR 40,000)	Living in South Africa	-43% use for investments, 57% as a speculative instrument in bitcoin for profit making, -98% aware of payment potential, but not utilizing.
Sas 2017 [12]	United Kingdom	Explores motivations, experience and trust in Bitcoin usage	Individual	Qualitative	20 bitcoin users; 18 male; 2 female; ages: 21–50 years; 6 users—less than 6 months of experience of bitcoin, 8 participants—6 months and 2 years, while the remaining 6 have more than 2 years; education—half of participants had Bachelor degrees, seven were school leavers, and three had Master degrees; variety of occupations: eight in administrative roles, four in financial and marketing sector, three school teachers, two unemployed, one in medical field, one in IT sector, and one student	Bitcoin Users in the United Kingdom	-Utilize bitcoin for savings, anticipating increased value -Varied usage: 8 for income generation, 7 for occasional investment, 5 for full-time investment -Limited use as currency—only 3 participants use for everyday transactions/payments -Also mentions convenience of sending money internationally

Table A1. Cont.

Study	Countries	Study Aim	Unit Case Analysis	Study Design	Population Description	Inclusion/Exclusion	Major Findings
Presthus 2017 [17]	Norway	Explores motivations and barriers for using Bitcoin as a digital currency	Individual	Cross-sectional	135 participants; 30 owned bitcoin before; Bitcoin users; Currency Trading Forex Brokers; University staff; University students (various faculties—Technology, Communication, Film and TV, Arts, Management); 98 participants answered, age: 19 years to 66 years old; 100 participants answered, gender: 24 women, 76 male; variety of occupations (81 responses—lecturer, (associate) professor, broker, bartender, senior analyst, systems developer, IT consultant, freelancer, project manager, and finally one instance of not working	18 years or older in Norway	-Bitcoin owners cited investments, curiosity, tech interest, monetary gain for owning bitcoin -Seven of the participants owned one or less bitcoins. Six owned between 2 and 99 bitcoins, two owned respectively 100 and 180, and one participant owned considerably more than the rest: 850
Zhauniarovich 2019 [23]	No locations specified (Open Source)	Paper analyzes Bitcoin donations to GitHub repositories.	Individual	Cross-sectional	Not Applicable	Not Applicable	-Limited bitcoin usage for donations (44 thousand deposits adding up to only USD 8.3 million in the last 10 years) -Weak correlation with repository popularity.
Kshetri 2022 [10]	El Salvador	Evaluation of the adoption of Bitcoin as legal tender.	Societal	Useability	Population of El Salvador	Population of El Salvador	-91.7% of businesses stated limited impact on businesses, low trust, minimal usage for transactions—only 14% of respondents -Remittances unaffected, accounted for less than 0.01% of debt payment -Most people did not use it after the initial USD 30 in their wallet.
Khairuddin 2016 [13]	Malaysia	Exploring motivations and experience with Bitcoin users	Individual	Qualitative	9 bitcoin users; Malaysia; all males; 1–3 years of experience; mean age—34 years, range 23–37 years old; 6 participants work in IT-related fields;	Bitcoin Users in Malaysia	-Amazon accepting bitcoin as payment signals its potential as future finance -Bitcoin offers cheap, efficient transfers, bypassing bureaucratic bank processes -Users value freedom, control, and transparency, praising blockchain's decentralization.
Eskandari 2016 [11]	Canada	Creating Bitcoin POS system for Montreal café.	Individual	Useability	Cafe customers; Montreal	Cafe customers in Montreal	-Observes and records useability point of sale usage in a cafe in Montreal -Customer interest grows through Bitcoin POS usage

Table A1. Cont.

Study	Countries	Study Aim	Unit Case Analysis	Study Design	Population Description	Inclusion/Exclusion	Major Findings
Gao 2016 [14]	United States	Exploring digital currency usage and understanding.	Individual	Qualitative	Bitcoin users; 10 males; 21–44 years; diverse educational background: highschool–college; variety of occupations (e.g., engineers, managers, counselors, business owners) non-bitcoin users; 4 females; 6 males; 21–62 years; educational background: highschool—graduate school; variety of occupations (e.g., engineers, managers, counselors, business owners)	18 years or older in America	-50% regular usage, highlighting faster international transactions, highlights benefits of security, lower fees, dual use as currency and investment -Five use bitcoin daily, two twice a month, three infrequently -Usage: investment and currency; noted acceptance at Overstock and Amazon -Three view it primarily as investment due to price volatility.
Alshamsi 2019 [6]	United Kingdom	Evaluating user experience in Bitcoin transactions for security and usability.	Individual	Cross-sectional	17 males; 5 females; 19–35 years old; 76% in 1st/2nd year university; 24% in their last year; All have a smartphone; basic knowledge of Bitcoin digital currency	18 years or older studying at Keele University	-All participants navigated Blockchain.info smoothly -Cards perceived more user-friendly than bitcoin due to perceived security and usability concerns -Learnability and efficiency issues noted.
Piotrowska 2017 [18]	Poland	Identifies barriers hindering Bitcoin's payment functionality.	Individual	Cross-sectional	628 respondents; Polish; those interested in cryptocurrency; 86% of respondents were already holding bitcoin	18 years or older in Poland	-Respondents optimistic about bitcoin's low transaction costs and high speed -Security concerns led to offline storage preference, mainly private keys on pen drives and paper.
Uymaz 2022 [15]	Turkey	Explores factors driving Bitcoin mining entrepreneurs	Individual	Qualitative	Bitcoin miners; 13 participants; 12 males, 1 female; 8 undergraduates, 5 graduates, 2 doctoral degrees, 12 participants have full time jobs; white collar; Turkish	Bitcoin miners in Turkey	-Miners invest savings for income and medium term profits; diverse financial goals -Value Bitcoin's decentralization, cite advantages in transfer, liquidity, wealth accumulation, and security. -Bitcoin purpose: -Investment: 6 participants -Payment + investment: 7 participants
Karabulut 2022 [19]	Turkey	Gauges Bitcoin awareness among investors	Individual	Cross-sectional	308 Academic Staff; 35 respondents own Bitcoin	Academic Staff at Erzincan Binali Yildirim University in Turkey	Out of the 308 academic staff respondents, 35 reported that they own bitcoin

Table A1. Cont.

Study	Countries	Study Aim	Unit Case Analysis	Study Design	Population Description	Inclusion/Exclusion	Major Findings
Henry 2019 [21]	Canada	Update on 2017 BTCOS, assessing Bitcoin awareness, ownership changes, and adopters' motivations.	Individual	Cross-sectional	Bitcoin users and non-users; Canada; male and female; educational background: highschool—university; income: below USD 30,000—above USD 70,000; employed, unemployed, not in labour force; variety of financial literacy knowledge (low, medium, high), variety of Bitcoin knowledge (low, medium, high); 2016—1997 respondents, 52 Canadian Bitcoin owners; 2017—2653 respondents	18 years or older in Canada	<ul style="list-style-type: none"> -In 2017, bitcoin ownership shifted towards investment (58%) from transactional purposes. -Increased awareness (64% to 85%) led to higher ownership (2.9% to 5%). -Demographically, 18–24 age group saw the most growth from 6% to 14%. -Ownership distribution varied, with 32% holding <0.1 BTC in 2016 and 34% having <0.05 BTC in 2017. -Motivations for ownership shifted, with 'investment' being the primary reason (58%). -Transactors cited buying goods/services (12%) and cost-saving technology (11%). -Payment-related motivations decreased from 39% in 2016 to 10% in 2017.
Huynh 2020 [20]	Canada	Key findings of the 2018 Bitcoin Omnibus Survey	Individual	Cross-sectional	Bitcoin users and non-users; Canada; male and female; educational background: highschool—university; income: below USD 30,000—above USD 70,000; employed, unemployed, not in labour force; variety of financial literacy knowledge (low, medium, high), variety of Bitcoin knowledge (low, medium, high); 2018—99 Canadian Bitcoin owners; 2017—117 Canadian Bitcoin owners	18 years or older in Canada	<ul style="list-style-type: none"> -Ownership fell from 4.3 to 2.8 percent among those with household incomes below USD 30,000 and rose from 4.3 to 7.0 percent among those with incomes above USD 70,000, creating an ownership gap that did not exist in previous years. -In contrast, Bitcoin owners reported using it more often for buying goods and M17services and/or making person-to-person transfers in 2018 -An overarching trend emerged in 2018 for both types of transactions: Bitcoin adopters are trending toward using Bitcoin more frequently for transactions -Figures 1 and 2 highlight the usage of bitcoin (frequency of transactions—rarely (once a year), sometimes (few times a year to once a month), often (few times a month) and the buying of goods and services (frequency—rarely, sometimes, often) -Frequency of transactions (2017): rarely = 52%, sometimes = 16%, often = 33% -Frequency of transactions (2018): rarely = 41%, sometimes = 13%, often = 46% -Use of bitcoin for buying goods and services (2017): rarely = 58%, sometimes = 11%, often = 31% -Use of bitcoin for buying goods and services (2018): rarely = 48%, sometimes = 12%, often = 40%

Table A1. Cont.

Study	Countries	Study Aim	Unit Case Analysis	Study Design	Population Description	Inclusion/Exclusion	Major Findings
Balutel 2023 [22]	Canada	The study examines Bitcoin awareness, ownership, usage, holdings, motivations, demographics, and validates technology adoption theories	Individual	Cross-sectional	Bitcoin users and non-users; Canada; male and female; educational background: highschool-university; income: below USD 30,000-above USD 70,000; employed, unemployed, not in labour force; variety of financial literacy knowledge (low, medium, high), variety of Bitcoin knowledge (low, medium, high);	18 years or older in Canada	<p>-Cash is still widely held by Bitcoin owners, and only about half of Bitcoin owners use Bitcoin to make payments</p> <p>-Canadians who owned Bitcoin remained stable at around 5% from 2018 to 2020, compared to 4% in 2017 and 3% in 2016</p> <p>-The main reason Bitcoin owners cited for owning bitcoins in the 2019 BTCOS was investment (39% of owners)</p> <p>-Share of Canadians who reported using bitcoin for transactions and transfers a few times a month or more decreased from 2018 to 2019</p> <p>-2019: About half of Bitcoin owners reported that they usually obtained their bitcoins through exchanges on a website or mobile app, while one-fifth reported mining their coins. Remaining Bitcoin owners were split among Bitcoin automated teller machines (ATMs) or directly from other people</p> <p>-The average share of Canadians who own Bitcoin increased from 3% in 2016 to around 5% since 2018; Canadians who were young, male, employed, and had a university degree, high household income and relatively low financial literacy were more likely to own Bitcoin</p> <p>-2% of women reported owning Bitcoin, while among men, ownership nearly doubled from 4.4% in 2016 to 8.3% in 2020</p> <p>-Decreasing proportion of Canadians who reported holding 1 to 10 bitcoins (from 39% in 2016 to 6% in 2019) and 10 or more bitcoins (from 13% in 2017 to 5% in 2018 and 2019). Concurrently, the share of holders with less than 1 bitcoin has increased from 54% in 2016 to 68% in 2017, 87% in 2018 and 89% in 2019.</p> <p>-From 2018 to 2019, the proportion of Bitcoin owners who never used their holdings to buy goods and services or to make person-to-person transfers increased (from 33% to 44% for purchases, and from 42% to 50% for transfers)</p> <p>-In 2019, Canadians cited investment as the most common reason (39% of owners) for owning Bitcoin, followed by technology (31% of owners), payments (15% of owners) and anonymity/trust (15% of owners)</p> <p>-In 2019, about half of owners used crypto asset exchanges, either on a website (41%) or through a mobile app (9%). Of the rest, 19% mined their own bitcoins, 9% obtained bitcoins through ATMs, 14% obtained them from friends or family (person-to-person transfers) and 9% used other channels</p> <p>-Web/mobile exchanges are the most preferred way to obtain bitcoin</p>

Table A1. Cont.

Study	Countries	Study Aim	Unit Case Analysis	Study Design	Population Description	Inclusion/Exclusion	Major Findings
Andreianova 2017 [8]	Not specifically mentioned	To analyze and classify the major use cases for Bitcoin using peer-to-peer Bitcoin exchange platforms.	Individual	Cross-Sectional	LocalBitcoin users	Users of LocalBitcoin	<ul style="list-style-type: none"> -Predominant uses cases involve investing and trading -3212 respondents (24.5% of total) stated that they buy bitcoin for investment purposes. -Respondents expect bitcoin to rise and support their long-term investment; 13,717 respondents (25.5% of total) stated that they buy and sell Bitcoin for trading purposes—to seek out extra income -Over half of the traders complete at least one trade a month, while one-third trade weekly or even daily -5570 respondents (10.35% of total) stated that they use bitcoin to store the value of their wealth—this was the largest use case in Argentina and Venezuela (23% of respondents) -5206 respondents (9.7% of total) said that they use bitcoin for remittance -35% of the LocalBitcoins user base had used bitcoin to buy goods and services, and 7479 respondents (13.9% of total) of our users identified payments as their main purpose for using bitcoins -4594 respondents (8.5% of total) said that they buy bitcoin to learn more about it and how it works -1181 respondents (2.2% of total) said that they use bitcoin to gamble online -1229 respondents (2.3% of total) said that they use bitcoin to pay for work and services; cites PayPal being banned in certain places, whereas Bitcoin works everywhere -Central + East Europe display high rates of Bitcoin payment and investments -Latin America displays highest rates towards remittance -Majority of users in African countries seek to use Bitcoin for profit generation -Asian countries strong display use for trading and investments

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