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Cryptocurrencies in Modern Finance: A Literature Review

Abderahman Rejeb[1], Karim Rejeb[2*], John G. Keogh[3]

[1]Doctoral School of Regional Sciences and Business Administration, Széchenyi István University, Hungary
[2]Higher Institute of Computer Science of El Manar, 2, Rue Abou Raïhan El Bayrouni, 2080 Ariana, Tunisia
[3]Henley Business School, University of Reading, Greenlands, Henley-on-Thames, RG9 3AU, United Kingdom
E-mail: [1]abderrahmen.rejeb@gmail.com, [2]karim.rejeb@etudiant-isi.utm.tn, [3]john@shantalla.org

[*)]Corresponding Author

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Abstract

The focus on cryptocurrencies in the finance and banking sectors is gaining momentum. In this paper, we investigate the role of cryptocurrencies in modern finance. We apply a narrative literature review method to synthesize prior research and draw insights into the opportunities and challenges of leveraging cryptocurrencies. The results indicate that cryptocurrencies offer businesses and individuals lower transaction costs, higher efficiencies, increased security and privacy, meaningful diversification benefits, alternative financing solutions, and financial inclusion. Challenges exist related to the integration of cryptocurrencies in modern finance. These include the lack of regulatory standards, the risk of criminal activity, high energy and environmental costs, regulatory bans and usage restrictions, security and privacy concerns, and the high volatility of cryptocurrencies. The current review is useful for scholars and managers, including those seeking to have a more balanced understanding of these emerging financial instruments.

Keywords:
cryptocurrencies, finance, efficiency, challenges, business

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Introduction

After the global financial crisis of 2008, public trust in conventional banking systems was a concern. Most specifically, the first signs of economic turmoil appeared on March 16, 2008, when Bear Stearns and Lehman Brothers declared bankruptcy (Wilson, 2019). The shock's ramification did not stop at these institutions; instead, the debt contagion continued to spread and hit other financial powerhouses such AIG, the Bank of America, Citigroup, JPMorgan Chase, Goldman Sachs, and Morgan Stanley. Beyond the United States, the global financial crisis also spread to Europe and Asia. For example, following the crisis, Finland reported decreases in industrial production, private investments, and exports (Söderlund & Kestilä-Kekkonen, 2014). In China, most financial institutions and foreign banks were suspended and then stopped recruiting staff (Marquez-Velazquez, 2010). Banks reported a significant shortage of liquidity after shadow banks had financed themselves using short term unsecured or collateralized market borrowing (Milne, 2018). At a global level, the reputation of banks and other financial institutions (e.g., insurance companies) was tarnished in the public eye.

In the aftermath of the 2008 global financial crisis, an unknown person, group, or organization operating under the pseudonym 'Satoshi Nakamoto' introduced an electronic peer-to-peer system based on the cryptocurrency bitcoin (Nakamoto, 2008). Bitcoin is a decentralized digital currency introduced in 2008 and deployed at the beginning of 2009. It came as a response to the financial institutions that often privatized profits and socialized losses (Lerer & McGarrigle, 2018). A significant impetus behind the creation of cryptocurrencies was the need to create a system that allowed quick and cheap transactions without the intermediation of any trusted third parties (e.g., banks) (Bação et al., 2018; Chapron, 2017; Kfir, 2020; Kolber, 2018; Sudzina, 2018). Similarly, many scholars, enthusiasts, and futurists consider bitcoin a future alternative for state-issued currency (Bouri et al., 2018; Bouri et al., 2017; Hong, 2017).

Since the bitcoin launch, more than 1,600 cryptocurrencies have entered into circulation (Wilson, 2019). Beyond the hype, cryptocurrencies are presently used to buy real goods and real services in the real world (Dostov & Shust, 2014; Guadamuz & Marsden, 2015). Cryptocurrencies present a significant shift away from the traditional design, management, and regulation of financial systems (Shahzad et al., 2018). The technology behind the proliferation of cryptocurrencies is blockchain (Hashemi Joo et al., 2019; Lu et al., 2019; Searing & MacLeod, 2019). Blockchain technology is defined by Treiblmaier (2018) as "a digital, decentralized and distributed ledger in which transactions are logged and added in chronological order to create permanent and tamper-proof records." Blockchain technology is based on peer-to-peer connectivity and cryptographic security, allowing a decentralized approach with enhanced transparency and trust instead of the centralized and opaque nature of traditional monetary systems. Briere et al. (2013) opined that cryptocurrencies, especially bitcoin, are new financial instruments and alternative investments with diversification benefits. Many cryptocurrencies are used as a medium of exchange for daily payments, and they inherently have similar characteristics to other financial markets, particularly precious metals (Omane-Adjepong et al., 2019).

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Blockchain technology has attracted considerable attention from central banks and international retail banks (Dashkevich et al., 2020; Polasik et al., 2015). Many financial institutions capitalize on blockchain to establish financial technology (often referred to as FinTech) startups to leverage blockchain in delivering financial services and underpin cryptocurrencies (Milne, 2018).

This paper strives to investigate the role and importance of cryptocurrencies in modern-day transactions and economic systems. A narrative literature review is conducted to synthesize prior research on cryptocurrencies from the finance perspective. Despite recent attempts to understand the phenomenon of cryptocurrencies, there is still a lack of scholarly insights that analyze cryptocurrencies' opportunities and challenges in modern financial systems. For example, Flori (2019) makes a comprehensive review of the financial applications of cryptocurrencies. Nevertheless, the scope of his study is narrowly focused on bitcoin. Chohan (2017) conducted a thematic review on cryptocurrencies. However, several points in Chohan's research remain theoretically unexplored and conceptually unelaborated, such as the challenges of cryptocurrencies in the financial ecosystem. Additional reviews have been published recently, addressing the relationship between privacy and cryptocurrencies (Harvey & Branco-Illodo, 2020; Herskind et al., 2020). However, they lack a comprehensive analysis of other factors influencing the uptake of cryptocurrencies in the financial ecosystem. Therefore, the study's novelty resides in providing a more balanced and more in-depth understanding of the opportunities and challenges brought about by the usage of cryptocurrencies in finance.

This study will fill in the current gap in the literature concerning the lack of comprehensive analysis of cryptocurrencies from the finance perspective. Moreover, business and finance researchers are still unfamiliar with the new opportunities these emerging digital financial instruments can offer to individuals, organizations, and financial institutions (Charfeddine et al., 2020). The research also identified a lack of reviews focusing on the opportunities and challenges of cryptocurrencies in modern finance. This study is one of the first attempts towards understanding the role of cryptocurrencies in reshaping and disrupting current financial systems. We argue that by clarifying what cryptocurrencies are, how they work, and how they can be used, we enrich the current literature, which is still notably inconclusive and deficient regarding the far-reaching possibilities cryptocurrencies in modern financial systems. Thus, our research objectives will answer the following research question "what are the opportunities and challenges of cryptocurrencies in modern finance?

This study offers several contributions. First, it sheds light on these emerging financial instruments' role in simplifying cross-border transactions, improving transactional privacy and security, providing innovative financing mechanisms, and promoting more financial inclusion. Dorfleitner & Lung (2018) document that the popularity of cryptocurrencies in the financial context has been marked by exponential market volume growth. We also contribute to this literature by a timely review, and we add to the debate by scrutinizing the themes discussed in the cryptocurrencies literature.

Methods

To answer the research question, we conducted a narrative literature review using different academic databases, such as Google Scholar, Scopus, Web of Science and Springer Link. A narrative literature review is a methodological approach that aims to establish a comprehensive understanding and critical evaluation of knowledge relevant to a particular topic and to potentially reveal weaknesses or problematize concepts, theories, or claims that deserve further research (Boell & Cecez-Kecmanovic, 2015). A narrative literature review is not meant to be exhaustive; instead, it is selective in the content it uses, aiming at advancing and contributing to theory development (Cronin et al., 2008). Unlike systematic literature reviews, compiling a sample of data does not necessarily require it to be representative, as learning as much as possible about a topic is the most important (Wetherell & Potter, 1992). The use of a narrative literature review enables us to investigate the different ways that cryptocurrencies have been conceptualized in prior studies as well as to assess the theoretical underpinning of this emerging paradigm in finance.

Being a relatively new research area (García-Medina & Hernández, 2020) that needs sound elaboration and clear conceptualization, and given the multiple perspectives from which cryptocurrencies have been approached, undertaking a narrative literature review of these financial innovations is more appropriate to help us address our research objectives. Our research method is well-established because narrative literature reviews have been commonly applied in several management, finance, and economics related studies (Gott et al., 2011; Ricciardi, 2004; Sharma & Kumar, 2010; Wet, 2005).

Beginning with a focus on the origin and foundation of cryptocurrencies, we referred to the paper of Nakamoto (2008) as it represents the first reference on cryptocurrencies and has been recognized as the seminal work that has laid the foundation for a large number of studies examining bitcoin and blockchain technology. Prior research that explores the operating fundamentals of blockchain, its functioning, and its applications have been referenced in order to differentiate between the technology underpinning Bitcoin (the blockchain protocol) and the cryptocurrency, bitcoin (Rejeb et al., 2018; Rejeb & Rejeb, 2020; Treiblmaier et al., 2020). Subsequently, we searched for articles, books, chapters, and conference papers that have in their titles, abstracts or keywords the words: “finance” and “cryptocurrencies”. The identified sources included in this review were screened for relevance on the basis of three questions: “Does the source have a minor or major focus on cryptocurrencies in the finance context?”, “Does the source present the opportunities of using cryptocurrencies in modern finance?” and “Does the source provide insights into the challenges of adopting cryptocurrencies in today’s financial systems?” We considered these questions during the screening of sources’ titles, abstracts, keywords, and research objectives and questions while looking for ideas or concepts pertaining to cryptocurrencies.

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Result and Discussion

Overview of Cryptocurrencies, Blockchain and Related Concepts

According to Trautman (2014), cryptocurrencies are a subset of digital currencies that may have either centralized institutions or are based on a decentralized network. In simple terms, cryptocurrencies are a new type of currency (Duque, 2020; Hudson & Urquhart, 2019) that is digital and produced from cryptographic algorithms, exchanged across the Internet using protocols such as peer-to-peer networking (Nakamoto, 2008). Another way to define cryptocurrencies is the fact that they are based on the use of complex cryptographic techniques to provide users with a secure and safe medium of exchange (Bulut, 2018). The creation of value (or money) and the triggering of transactions are governed by the mining process, which is a set of mathematical algorithms that are implemented within the underlying protocol (Adhami et al., 2018; Cennamo et al., 2020). Most cryptocurrencies are created to introduce new units of currency with a limited total amount (Baur et al., 2015). Unlike state-issued currencies, cryptocurrencies are not governed by established laws, but by technology (Dodd, 2018). Accordingly, this makes cryptocurrencies a new invention that is different from traditional currencies. In the field of finance, the advent of cryptocurrencies represents a new area that requires additional public and academic attention (Aslan & Sensoy, 2020; Baumöhl, 2019; Cerqueti et al., 2020; Corbet et al., 2019; Platanakis et al., 2018; Vidal-Tomás et al., 2019).

At the time of writing, the cryptocurrencies market was valued at approximately USD 300 billion, with nearly 80% of that value in Bitcoin tokens. The landscape for cryptocurrencies has grown exponentially over the years (Babkin et al., 2017; Dimitrova et al., 2019). From a technical perspective, cryptocurrencies work through a peer-to-peer, distributed, and decentralized network (Nakamoto, 2008). That said, there are no specific regulatory bodies (Alonso & Luis, 2019; Ng & Griffin, 2018; Yalaman & Yıldırım, 2019) that verify and control the transactions and the transfer of value within the network. Second, cryptocurrencies operate within a robust, unhackable peer-to-peer infrastructure underpinned by blockchain technology (Clark & Burstall, 2018; Karpan, 2019; J. Wang et al., 2017). The technology helps to guarantee that financial transactions and value transfers between two parties, regardless of their type, are carried out directly and without the intermediation of a third party (Keogh, Dube, et al., 2020; Keogh, Rejeb, et al., 2020; Treiblmaier, 2019). In finance applications, the power of blockchain technology lies in its ability to solve the double-spending problem (Treiblmaier, 2019). This is the likelihood that the same digital token can be spent more than once because a digital token consists of a digital file that can be duplicated or falsified (Chohan, 2017). Cryptocurrencies use the public Internet, which provides speed, resiliency and efficiency (G. Wang, 2019). The absence of trust between the exchange partners is empowered by public-key cryptography mechanisms used to secure the conclusions of money transactions (Korpela et al., 2017; Rowan et al., 2017; Uddin et al., 2019).

A common misconception among the general public is the confusion between the terms “bitcoin” and “blockchain.” As previously stated, bitcoin was the first successful cryptocurrency that used blockchain technology (Nakamoto, 2008). The decentralized

approach brought about by blockchain enables the execution of transactions based on cryptocurrencies to be simplified and to bypass the intermediation of banks, securities settlement systems, and brokers (Rejeb, 2018a; Rejeb et al., 2018, 2019a). Moreover, blockchain constitutes a global network (Kim, 2018; Pinna et al., 2018) that helps to generate new units of currency and to facilitate the transfer of existing units from one party to another through transaction broadcasting and computational proof-of-work protocols. All cryptocurrencies use the peer-to-peer design of blockchain to facilitate instant transactions. Since cryptocurrencies are not state-issued currencies (Bech & Garratt, 2017; Bunjaku et al., 2017; Fantacci, 2019; Gurrib et al., 2019), they are not monitored by central banks, and hence they are often called decentralized currencies. Cryptocurrencies aim to overcome the challenges related to gold-based and fiat currencies, operating on an algorithmic base with a deterministic supply (Bartos, 2015) and growth rate defined according to the rigor and precision of mathematics. In the Bitcoin system, for example, money creation is scheduled so that the number of units will converge to 21 million units (Fabian et al., 2016).

More recently, there are about 16.523 million units of bitcoin in circulation, which means that 79% of bitcoin has already been mined (Wilson, 2019). The limit of the number of bitcoins being minted (i.e., mined) helps ensure a stable supply of this cryptocurrency as no individual, financial institution, or government has the power to control the supply of bitcoins or to inflate their value. Every unit of cryptocurrency has its own address with the public and private key. Transactions are triggered using the private key. At any point in time, there is a fixed number of cryptocurrencies, and the blockchain enables a network user to prove ownership of a particular cryptocurrency and to verifiably transfer ownership without the recourse to a third party (Brito et al., 2015). In the cryptocurrency financial system, users can gain value by engaging in particular transactions with other users (e.g., sale of products) or by mining (Courtois et al., 2014; Hayes, 2015; Lim et al., 2014). The latter is the process of recording several transactions as a block in the blockchain (Conti et al., 2018). Miners are specialized nodes (i.e., computers) that pick up transaction records, verify them and create new blocks by performing complex computing operations and cryptographic functions. In the example of bitcoin, miners solve the mining puzzle (Houy, 2014) in approximately ten minutes and receive bitcoin rewards in return.

One of the main concepts of the blockchain is records or transactions (Rejeb, 2018b; Rejeb et al., 2019b; Rejeb & Bell, 2019; Rejeb & Rejeb, 2019). Blockchain transactions can be characterized as a process when the involved parties acquire or lose a certain status (e.g., the status of the owner) (Lanko et al., 2018). In order to create new records (e.g., transactions), the hash of the first block (or the previous block) of the record should be forwarded to the miner who employs it and generates a hash of the second block (Tama et al., 2017). The process of introducing a new block into blockchain and solving the hash is what we have already mentioned, mining or proof-of-work (Nakamoto, 2008). It simply means the execution of a specific algorithm (for example, Bitcoin uses "Proof-of-Work, Ethereum uses "Proof-

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of-Stake") that allows the creation and the addition of new blocks to the blockchain. This approach prevents attackers from validating an invalid transaction. Moreover, the miners perform computationally costly tasks to participate in what essentially constitutes a lottery for the right to add the next block to the chain (Catalini & Gans, 2016; Michelman, 2017). Before the transaction records are posted to the blockchain, a great number of participants (i.e., nodes that control over 50 percent of the total computer power in the network) reach an agreement or a consensus, after which the next block is added.

After the block is successfully introduced with its new identity (represented by the block hash) in the blockchain, it is propagated and distributed among all the nodes of the network to ensure that they are all updated with the last version of the blockchain. A reward, in the form of a crypto-token such as Bitcoin or Ether, is rewarded to the miner who performed the work and verified the correctness of the transaction. In doing so, miners will be motivated to commit computing resources to solve the puzzles and to set off the costs incurred in the blockchain (e.g., electricity costs) (Hsieh et al., 2018; Symitsi & Chalvatzis, 2018). This procedure is continuously reiterated as more transactions are introduced to the network.

Opportunities of Cryptocurrencies in Modern Finance

As previously stated, the use of blockchain technology in leveraging cryptocurrencies can mitigate the cost of trust (Berg et al., 2019), which is an essential element that manifests itself in various ways in the financial system. These costs include the intermediary's commissions, the fees of entering and upholding contracts, settlement procedures, cybersecurity, and user authentication. Money depositors must trust banks to secure their savings (Baldwin, 2018; Maurer et al., 2013; Raymaekers, 2015; Zook & Blankenship, 2018).

The financial sector has multiple challenges and experienced recent crises. For example, millions of people around the world lost their jobs and homes as a consequence of the 2008 global financial crisis. Although cryptocurrencies are not a panacea for all financial problems, it is still important to explore how these economic and financial instruments can impact financial stability and establish a more resilient financial sector. It is widely argued that centralized financial institutions concentrate risks, socialize losses and collect significant economic rents (Zhang, 2017). Cryptocurrencies can address several issues inherited in the current financial systems, such as the lack of trust, transaction inefficiencies, and instability (Nakamoto, 2008).

The traditional approach of cross-border payment is characterized by its inefficiency, high cost, and liquidity blockage. Payment processes are not transparent, and they present several uncertainties regarding pricing and fraud risks. Accordingly, payments in cryptocurrencies could mitigate several of these issues. According to Buhalis et al. (2019), cryptocurrencies can be used to prevent fraudulent exchanges or payments, making service transactions straightforward and efficient.

The most extensive use of cryptocurrencies is online payment options. The proliferation of cashless payments and the use of credit cards have contributed to the emergence of cryptocurrencies as the most popular form of payment on the Internet. Digital currencies have the potential to affect cash flows and supply chain structures because exchange partners could potentially trade, exchange value, and settle their payments using cryptocurrencies (Y. Wang et al., 2019). By simplifying payments through cryptocurrencies, Pournader et al. (2020) posit that companies can make instant money transfers, reducing commissions necessary to pay for goods and services. For example, Ripple is an open-source, peer-to-peer decentralized digital payment platform that enables near-instantaneous transfers of currency regardless of their form. Ripple used the blockchain to connect existing bank ledgers and facilitate near real-time cross-border payments. Ripple can handle more than 1,500 transactions per second. Ripple users are equipped with a pair of signing/verification keys to send payments securely. Each Ripple transaction submitted to the network requires a transaction fee specified in the blockchain. Today, some online shops allow their consumers to make their payments in cryptocurrencies, such as bitcoin, Litecoin and Peercoin, despite the fact that cryptocurrencies are not yet accepted in many countries (Mendoza-Tello et al., 2018; Omane-Adjepong & Alagidede, 2020; Vandezande, 2017). The payments in cryptocurrencies can be carried out among accounts or wallets, independently of a central party, resulting in lower transaction costs, increased security and privacy (Till et al., 2017). On these points, Nica et al. (2017) argue that the popularity of the Bitcoin system is attributed to the low transaction fees it offers to users, which makes it a viable alternative to conventional payment services. However, to achieve this cost advantage, Alonso-Monsalve et al. (2020) note that cryptocurrency trading should operate on the basis of different assumptions that may not hold in specific situations, including quick links between users, low transaction costs, and high liquidity.

The settlement time of cryptocurrencies is much shorter than other payment methods. In the case of bitcoin, the settlement time of ten minutes on average is much faster than with any non-cash financial transaction, which may take days or weeks (Nakamoto, 2008). Although transferring a large amount of cash is a risk and problematic issue in the physical world, cryptocurrencies can be transferred very rapidly and covertly between users. Of note, the Bank of England already released a discussion paper, highlighting the potential use of cryptocurrencies to facilitate interbank settlement (Glaser & Bezzenberger, 2015). According to Richards (2018), some stakeholders in the payments area argue that the availability of cryptocurrencies could be a viable alternative for central bank settlement instruments that not only reduces risk but also increases the efficiency of business transactions. The use of cryptocurrencies can also mean that transaction accounts no longer need to be held on the balance sheets of banks. Instead, all transactions in cryptocurrencies could be recorded on a single mutual distributed ledger (or a blockchain) to facilitate banking arrangements. The cryptocurrency implementation often utilizes the proof-of-work mechanism to record all transactions in a public ledger, and in this way, protect consumers from fraud (Cocco

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et al., 2017). In addition, cryptocurrencies could solve the disruption of payment processes due to specific settlement failures.

Cryptocurrencies are appealing for merchandisers because chargeback is not possible. It means that there is no need for customers to file a complaint with their credit card company to dispute the payment with the goal of cancelling or reversing that payment (Wilson, 2019). Similarly, cryptocurrencies eliminate the need for settlement in central bank reserves and allow a return to monetary operations based on the quantity of money rather than the price for borrowing and lending of money in short term money markets (Milne, 2018).

Although cryptocurrencies were created for the sake of exchanging goods and services, a report from Coinbase and ARK Invest estimates that the majority of users consider cryptocurrencies, and particularly bitcoin, strictly as an investment (Burniske & White, 2017). Likewise, cryptocurrencies are a new type of speculative asset, which is attractive to investors who wish to make profits. For example, Katsiampa (2017) finds that the bitcoin market is characterized by its highly speculative nature. As per Dyhrberg et al. (2018), the low adoption of bitcoin and its sufficient market depth contribute to the general perception that bitcoin is an investible asset. The literature on bitcoin price is increasingly growing, providing evidence that cryptocurrencies exhibit independent price behavior from other conventional financial instruments, such as bonds, stocks, and commodities (Baur et al., 2018; Bouri et al., 2017). The high volatility in cryptocurrencies investment is compensated by the high expected return. Similarly, the low correlation of cryptocurrencies with stocks, bonds, commodities, and foreign exchange rates creates a potential for diversification for investors. The opportunities brought by the diversification benefits of cryptocurrencies have garnered considerable attention with research reporting various findings. Remarkable among the prior studies is the work of Bouri et al. (2017), who posit that bitcoin can be hedged in a limited number of scenarios and remains a good option for diversification techniques similar to stocks, bonds, gold, and other commodities. However, Dorfleitner & Lung (2018) argue that in case cryptocurrencies are used as an investment rather than just a payment or exchange medium and held for diversification reasons within an investor's portfolio, the behavior of cryptocurrency returns and their volatility might be sharply different on weekends. Therefore, cryptocurrencies are not only perceived as an alternative currency but also an object of investment. Similarly, a study by Citigate Dewe Rogerson revealed that every fifth adult resident in England who never had a cryptocurrency would like to buy it by 2021 (Volosovych & Baraniuk, 2018).

Cryptocurrency-based economies, as well as mounting investor interest in investing in crypto assets, have led to new ways being sought to fund blockchain-based projects and raise capital. The fundraising mechanism through which new companies and startups raise capital from the public by selling tokens (i.e., a record in the blockchain or other distributed information system that certifies the ownership of a user of a particular asset.) is called Initial Coin Offering (ICO) (Demidenko et al., 2018). Usually, the ICO starts with the announcement of a project to be financed and the requested marketing activities

to attract as many prospective investors as possible. Simply put, ICOs are usually initiated by disseminating a new business idea to the public explained through a white paper, in which the proposer team, the target sum to be collected and the given number of tokens that will be distributed among subscribers according to a predetermined exchange rate with one or more existing cryptocurrencies are set out. Although the ICO market is still at the infancy stage, the size of this market is substantial because the scope of the ICO has exponentially expanded beyond its initial purpose (Momtaz, 2019)

The ICO is often viewed as one of the significant innovations in entrepreneurial finance. In line with Härdle et al. (2020), The use of ICO constitutes a promising financing channel for entrepreneurs, though it is not fully understood by some investors, and companies are still offering an ICO without economically viable use cases. According to Amsden and Schweizer (2018), the ICO market already exceeded the whole venture capital industry in Europe. The reason for this soaring development lies in the fact that the ICO represents an opportunity to participate in a project or in decentralized autonomous organizations (DAOs). DAOs are simply a new type of firm that can be run through the use of smart contracts (i.e., self-executed computer programs) and the Turing-complete programming language, such as Ethereum. DAOs can also be arrangements of smart contracts, each with their own specific sets of tasks, designed to work together securely within their intended area of application (Zook & Blankenship, 2018). Besides the hardcoded and fully transparent policy guidelines, monetary policies associated with cryptocurrencies can be supported by a set of underlying protocols that enable the development of DAOs which can function as policymakers (Calcaterra et al., 2020). In contemporary times, the use of ICO is spreading across the entire globe, and several nations and businesses are involved in ICO projects. For example, the ICOs collected exceeded USD 5.2 billion dollars in 2017 alone (Ibba et al., 2018). Despite their promisingly high returns, ICOs are precarious investments because the process is as yet unregulated, leaving room for scams, thefts, and deceptive projects. As stated by Momtaz (2019), the ICO market is subject to ongoing regulatory uncertainty with several uncoordinated interventions like the bans in China and South Korea that resulted in considerable market reactions.

The tokens sold through ICOs can be transferable, fungible or interchangeable with others on the same platform (Crosby et al., 2016). Furthermore, ICO tokens are also tradable on secondary markets, even before the ICO is complete. In reality, the tradable feature of these tokens serves to motivate agents and prospective investors to engage in the venture.

The main idea of ICOs is to create decentralized applications (often shortened to Dapps). Dapps are developed based on smart contracts that are embedded in the blockchain network. A critical element of Dapps is the mechanism of distributing tokens. This mechanism includes three processes; the mining process, the fundraising process, and the development process. As previously mentioned, the mining process is the distribution of tokens to users who contribute most to the operation of the Dapps, as is the case in Bitcoin. In contrast, the fundraising process represents the distribution of tokens to

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the funders of the initial development of the Dapps. Lastly, the development process is the generation of tokens through a predefined apparatus that are available only for the development of the decentralized application. Unlike the IPO process, which can take several months, the issuance of ICO tokens takes only a month or two (Hu et al., 2018). After the conclusion of an ICO, the purchased tokens can be traded on some cryptocurrency exchange platforms.

Hundreds of startups and companies are currently exchanging cryptocurrencies. Cryptocurrencies have significantly supported the global rise of e-commerce. The development of the cryptocurrency market creates a new trust model for e-commerce (Mendoza-Tello et al., 2019), increases monetary circulation (Mendoza-Tello et al., 2018), and allows efficient and private online and cross -border commerce (Foley et al., 2019). In 2012, it was estimated that e-commerce had already reached its pinnacle exceeding USD 1 trillion, and since then, it has seen an annual increase of approximately 15 percent due to the use of cryptocurrencies (Jaag & Bach, 2015). Similarly, measures of usage for bitcoin reported between 60,000 and 70,000 transactions daily, with a total transaction volume of between EUR 15 and EUR 30 million (Peters et al., 2015). Many of these important transactions are owing to the high speed, low cost and efficient nature of virtual currencies.

The blockchain protocol and cryptocurrencies are not only incredibly useful for large companies; small businesses can also benefit from micropayments and exchange party transactions. As empirically evidenced by Vincent & Evans (2019), cryptocurrencies have a significant positive relationship with financial inclusion and financial sector development. The authors further note that countries featured by a high level of cryptocurrency use tend to have higher levels of financial inclusion and financial sector development. In the view of Larios-Hernández (2017), the technology underpinning cryptocurrencies, namely, blockchain, supports a novel type of inclusive entrepreneurship for the bottom of the pyramid (BoP), offering opportunities that improve social and economic conditions for disenfranchised communities. Likewise, Kaponda (2019) believes that one of the goals of the ecosystem of digital financial services is to encourage the use of cryptocurrencies, empower social communities, and to target national goals like financial inclusion, economic health, and the sustainability of the financial systems. Although problems in the blockchain include scalability limitations (i.e., the number of transactions that can be processed in a second, 7 to 10 transactions in the case of bitcoin), it is expected that the next generation technology adopted by the Internet of Things Application (IOTA), tangle, can solve this problem and leverage cryptocurrencies for the transfer of value (i.e., money) in an open-source ecosystem among people as well as machines. IOTA cryptocurrency is purposefully developed for the selling of data from IoT devices (i.e., physical objects that are seamlessly integrated into the information network). In addition, transactions using IOTA are feeless, and they suit the demanding IoT ecosystem. Sharma et al. (2020) assert that the cryptocurrencies created based on IOTA tangle are usually supported with features of management, fair ordering, secure services, and ad hoc transactions.

In sum, the use of cryptocurrencies in everyday transactions and financial ecosystems is steadily increasing. As cryptocurrencies continue to grow, there is a potential that they may replace the role of traditional currencies and become more and more plausible. However, several challenges lie ahead, inhibiting the wide-scale implementations of cryptocurrencies as an exchange medium of value and a source of profits. This is discussed in the next section.

Challenges of Cryptocurrencies in Modern Finance

The growing momentum of cryptocurrencies and FinTech brings certain risks that raise several questions and concerns regarding the viability of the future integration of virtual currencies in the monetary and financial system, particularly in the absence of legislation and regulatory standards (Avdeychik & Capozzi, 2018; Mendoza-Tello et al., 2018; Nica et al., 2017).

Today, there is exponential growth in the development of online black markets. The advent of bitcoin has already revived black markets and provided numerous opportunities due to their quasi-anonymity, which makes it difficult to trace the identity of the operators and users (Baldimtsi et al., 2017). According to Kerr (2018), bitcoin represents a perfect tool for carrying out business on the digital black market because it undermines the policing efforts of authorities. Cryptocurrencies have the potential to induce structural changes in how the black markets operate. In the illegal darknet marketplaces, cryptocurrencies are usually used to facilitate the sale of weapons, drugs, and other illicit goods (Miller, 2016). For example, an enormous number of outgoing mail from a large Australian drug dealer led the authorities to seize over 24000 bitcoin, along with a wide array of drugs and cash (Foley et al., 2019). Similarly, cryptocurrencies encourage the monetary system that is used for illegal transactions, including drug trading, money laundering, and child pornography. As a result, the omnipresence of black markets in controlled economies threatens the stability of people's lifestyles, their activities, and their incomes (Scharding, 2019).

Cryptocurrencies are associated with illegal activities due to their ability to challenge government supervision of monetary policy and bypass existing regulatory schemes. Likewise, cryptocurrencies are considered the largest unregulated markets in the entire world. Alonso & Luis (2019) state that there is no regulation or rulings on how to operate using cryptocurrencies for some European countries, such as Austria, Belgium and Croatia. The decentralized nature of cryptocurrency-based transactions makes it harder to trace and, thus, may help disguise criminal activities (Afzal & Asif, 2019). In 2011, the online black market known as the "Silk Road," established by Ross Ulbricht (operating under the pseudonym of "Dread Pirate Roberts"), was shut down by the Federal Bureau of Investigation (FBI). The FBI estimated that over 9.5 million bitcoin was used to purchase illicit goods from the Silk Road website (Wilson, 2019). This incidence alerted citizens, companies, and governments to the use of bitcoin and other cryptocurrencies for illicit trade. Nevertheless, once cryptocurrencies are exchanged for fiat currencies, it is easier to detect the sources of money, as was

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the case with Silk Road. Consequently, the use of cryptocurrencies must strictly adhere to anti-laundering regulations (Fadeyi et al., 2020).

As cryptocurrencies gain more recognition and popularity, they are likely to spill over into other domains and affect other industries. The underpinning technology of cryptocurrencies, blockchain, is heavily dependent on the consumption of energy, graphic processing units, and power-intensive computing abilities to mine cryptocurrencies (Fadeyi et al., 2020). Vaz & Brown (2020) estimate that a payment transaction on the Bitcoin platform uses around fifty-eight times the energy of that for Visa credit transactions. Considering the fact that Visa relies on multiple banking and institutional systems that need enormous amounts of energy to function, the authors argue that this energy consumption is still dwarfed by the energy use of cryptocurrencies. Furthermore, the mining processes of cryptocurrencies have received similar adverse publicity following reports that cryptocurrencies involve the vast consumption of energy and have a harmful impact on the environment (Wilson, 2019). In this regard, some analysis has compared the considerable computing power needed for verifying and maintaining bitcoin transactions to the annual energy consumption of countries such as Ireland and Paraguay (Campbell-Verduyn, 2017). In another study, the Bitcoin network is estimated to consume as much energy as Austria (Afzal & Asif, 2019). The energy consumption required for the validation of every bitcoin payment is almost USD 2.00 per transaction (Milne, 2018). Even the processes and resources committed to a single bitcoin transaction could supply electricity to a British home for a month, with environmental costs socialized and economic gains privatized. The initial application of blockchain, namely the Bitcoin, has been designed with no consideration of the environmental effects of the technology (Truby, 2018). Although the current mining technology is oriented to be more power-efficient in the future, the high rate of electricity consumption and emissions are expected to rise to the extent that mining cryptocurrencies may not be profitable in the foreseeable future.

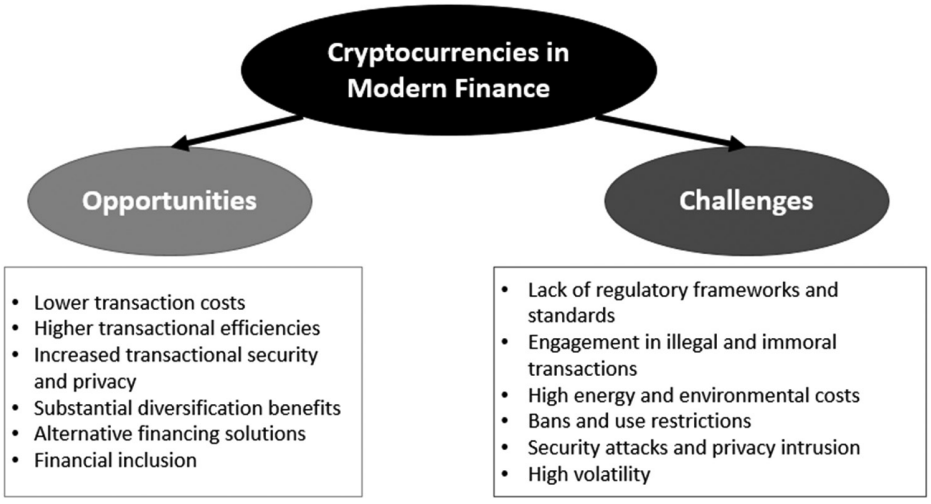
On a broader scale, several countries such as Germany, China, and the US have opposed the use of cryptocurrencies. Some bankers also discourage the idea of investing in cryptocurrencies, and specifically bitcoin. A few countries have adopted an explicit position regarding the use of cryptocurrencies and restricted their use in several activities. As a case in point, the German central bank has warned investors from investing in cryptocurrencies. Likewise, China has banned residents from trading cryptocurrencies and made ICOs illegal (Button, 2018). Developing countries such as Iran have also expressed concerns regarding cryptocurrencies, and the Central Bank of this country has recently announced that cryptocurrency trading is illegal (Alam & Zameni, 2019). The growing use of cryptocurrencies as a medium of payment increases the likelihood of tax evasion. In this respect, Marian (2013) noted that two critical attributes of currencies drive the rise of illicit transactions. First, there are no conditions as to the number of wallets that users can possess, allowing them to transact with high privacy. Second, the disintermediated approach of cryptocurrencies allows users to bypass the supervision of financial intermediaries. Rehman et al. (2019) argue that the pseudonymization of

cryptocurrencies makes payment networks unable to be easily monitored and regulated by governments.

Although several countries are collaborating to eliminate tax evasion, cryptocurrencies can act as a tax haven, thus defeating governments' ability to audit and prosecute tax evaders. A more worrying fact is also the possibility of utilizing cryptocurrencies to finance terrorism. It is their capability to cloak transactions with a high level of privacy and anonymity, which makes payments in cryptocurrencies highly suitable for the financing of transnational terrorist activities and global criminal structures.

Although cryptocurrencies are hinged on the robust security features that are enabled by blockchain technology, users are not immune to hacking, fraud, theft, and privacy intrusions. Cybercriminals have already been able to target exchanges and successfully steal thousands of bitcoins. For example, in its short history, bitcoin has experienced over 40 thefts, including a few incidents in which the stolen value of bitcoin exceeded USD 1 million (Bunjaku et al., 2017). Security concerns are still a significant issue in the handling and storage of cryptocurrencies. Hackers may attack a user's wallet and steal the cryptocurrency units. In 2016, an application built on Ethereum protocol proved faulty and resulted in the theft of Ether tokens worth roughly USD 70 million at the time (Auer, 2019). Moreover, the security of cryptocurrencies relies essentially on asymmetric public and private keys encryption. However, the knowledge of the private key equally represents the ownership of bitcoin (Wei et al., 2019). As a result, the loss of private key or other credentials may result in the loss of control over the wallet. This also means that the cryptocurrency user will not be able to recover the funds since there is no central authority that monitors the system. The theft of private keys can be carried out using several techniques such as the installation of buggy or malicious codes, phishing, key loggers, and Trojan horses that effectively capture all user keystrokes and pass them to a remote attacker. Therefore, these security loopholes raise serious concerns for those wishing to invest in cryptocurrencies (Bonneau et al., 2015).

Figure 1. The Opportunities and Challenges of Cryptocurrencies in Modern Finance



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Unlike government-issued currencies, cryptocurrencies are neither represented in physical form nor does a regulatory authority control them. They merely derive their value from the expectation of the community and the confidence of those taking part in the respective system. A significant drawback of cryptocurrencies is their high volatility, mainly because of their design and free exchangeability (Jaag & Bach, 2015). In fact, cryptocurrencies are subject to high volatility as there is no central authority guaranteeing the stability of their value. For example, the price for a single bitcoin climbed from USD 13 in January 2013 to USD 1242 on November 29, 2013, just falling short of the price of an ounce of gold (Hughes & Middlebrook, 2014). The volatility of cryptocurrencies can be leveraged and intensified if financial institutions engage in speculative investments, resulting in chain reactions and financial crises. Similarly, the prices of cryptocurrencies can create bubbles. The magnitude of volatility and uncertainty related to cryptocurrencies make it challenging to provide reliable estimates for reporting and auditing purposes, especially from a compliance and tax reporting perspective. Srokosz & Kopciaski (2015) argued that the high volatility of cryptocurrencies could be a critical factor that hampers trust in their usage for transaction payments. Tucker (2013) noticed that a high volatility level increases the risk of holding cryptocurrencies and the likelihood of their manipulation through signaling false positive statements in order to sell the purchased cryptocurrency at higher prices. In such a scenario, when investors sell out their cryptocurrencies, the supply increases resulting in the decrease of the price of a given cryptocurrency and severe losses for other holders. Figure 1 summarizes the findings of the review and the points discussed earlier in this section.

Conclusion

In this paper, we have synthesized the literature on the role and challenges of cryptocurrencies in modern business and financial systems. The mounting popularity and pervasiveness of cryptocurrencies reveal that the existing financial ecosystems are, in many instances, unable to respond to citizen's needs and concerns in the wake of the devastating 2008 financial crisis. The applications of cryptocurrencies can range from simple to complex financial transactions. Many of the benefits of cryptocurrencies are tangible and reflected in their ability to drive more efficient online transactions, lower costs, and streamlined payment processes. The use of cryptocurrencies also implies an increased level of efficiency in trading and exchanging value through the Internet. Cryptocurrencies help to spur innovation and create new business models. A cryptocurrencies-based ecosystem can provide opportunities for new market entrants and support startups through facilitating the process of fundraising. For instance, initial coin offerings enable entrepreneurs and investors to finance new projects without the recourse to intermediaries and endorsements of traditional investors and financial bodies.

The programmability of cryptocurrencies prompts the development of autonomous decentralized organizations and the proliferation of automated trusted machine-to-machine transactions. With the recent emergence of the machine economy, there is a potential for cryptocurrencies to simplify the trading and exchange of data generated from the Internet

of Things devices (e.g., sensors) in data marketplaces. Despite all these advantages, several challenges remain. One of the biggest hurdles in the spread of cryptocurrencies is the lack of governance in peer-to-peer networking transactions. Users are at risk of being victims of fraud and cyberattacks. In addition, cryptocurrencies are underpinned by blockchain technology, which could enable malicious actors to operate without oversight. In cases where bugs affect cryptocurrencies or the private key is stolen, users can lose their wallets and their ability to transact with other parties. Besides these drawbacks, the mining and generation of cryptocurrencies require substantial electric energy consumption that often necessitates economies of scale. Investors and businesses might also consider the use of cryptocurrencies to facilitate tax evasion, money laundering and the financing of illicit activities.

Although this study aims to explore the advantages of cryptocurrencies and the factors inhibiting their development into a widely used currency, it does not cover in great depth all information surrounding this fast-emerging area in the evolving global financial ecosystems. Hence, future studies may provide additional insights through comprehensively considering other research directions.

References

Adhami, S., Giudici, G., & Martinazzi, S. (2018). Why Do Businesses Go Crypto? An Empirical Analysis of Initial Coin Offerings. *Journal of Economics and Business*, *100*, 64–75. https://doi.org/10.1016/j.jeconbus.2018.04.001

Afzal, A., & Asif, A. (2019). Cryptocurrencies, Blockchain and Regulation: A Review. *The Lahore Journal of Economics*, *24*(1), 103–130.

Alam, N., & Zameni, A. P. (2019). Existing Regulatory Frameworks of Cryptocurrency and the Shari'ah Alternative. In Billah, M (eds). *Halal Cryptocurrency Management,* 179–194. London: Palgrave Macmillan.

Alonso, N., & Luis, S. (2019). Activities and Operations with Cryptocurrencies and Their Taxation Implications: The Spanish Case. *Laws*, *8*(3), 1-13.

Alonso-Monsalve, S., Suárez-Cetrulo, A. L., Cervantes, A., & Quintana, D. (2020). Convolution on Neural Networks for High-Frequency Trend Prediction of Cryptocurrency Exchange Rates using Technical indicators. *Expert Systems with Applications*, *149*, 113250. https://doi.org/10.1016/j.eswa.2020.113250

Amsden, R., & Schweizer, D. (2018). Are Blockchain Crowdsales the New "Gold Rush"? Success Determinants of Initial Coin Offerings, *SSRN Scholarly Paper ID 3163849*.

Aslan, A., & Sensoy, A. (2020). Intraday Efficiency-Frequency Nexus in The Cryptocurrency Markets. *Finance Research Letters*, *35*, 101298. https://doi.org/10.1016/j.frl.2019.09.013

Auer, R. (2019). Beyond the Doomsday Economics of "Proof-of-Work" in Cryptocurrencies. *SSRN Scholarly Paper ID 3331413*.

Avdeychik, V., & Capozzi, J. (2018). SEC's Division of Investment Management Voices Concerns Over Registered Funds Investing in Cryptocurrencies and Cryptocurrency-Related Products. *Journal of Investment Compliance*, *19*(2), 8–12.

http://journal.uinjkt.ac.id/index.php/etikonomi
DOI: htttp://doi.org/10.15408/etk.v20i1.16911

Babkin, A. V., Burkaltseva, D., Pshenichnikov, W., & Tyulin, A. (2017). Cryptocurrency and Blockchain-Technology in Digital Economy: Development Genesis. *St. Petersburg State Polytechnical University Journal. Economics*, *67*(5), 9–22.

Bação, P., Duarte, A. P., Sebastião, H., & Redzepagic, S. (2018). Information Transmission Between Cryptocurrencies: Does Bitcoin Rule the Cryptocurrency World? *Scientific Annals of Economics and Business*, *65*(2), 97–117.

Baldimtsi, F., Kiayias, A., & Samari, K. (2017). Watermarking Public-Key Cryptographic Functionalities and Implementations. In Nguyen, P. Q., & Zhou, J. (Eds.). *Information Security,* 173–191. Berlin: Springer.

Baldwin, J. (2018). In Digital We Trust: Bitcoin Discourse, Digital Currencies, and Decentralized Network Fetishism. *Palgrave Communications*, *4*(1), 1–10. https://doi.org/10.1057/s41599-018-0065-0

Bartos, J. (2015). Does Bitcoin follow the hypothesis of efficient market? *International Journal of Economic Sciences*, *4*(2), 10–23.

Baumöhl, E. (2019). Are Cryptocurrencies Connected to Forex? A Quantile Cross-Spectral Approach. *Finance Research Letters*, *29*, 363–372. https://doi.org/10.1016/j.frl.2018.09.002

Baur, A. W., Bühler, J., Bick, M., & Bonorden, C. S. (2015). Cryptocurrencies as a Disruption? Empirical Findings on User Adoption and Future Potential of Bitcoin and Co. In Janssen, M., Mäntymäki, M., Hidders, J., Klievink, B., Lamersdorf, W., van Loenen, B., & Zuiderwijk, A. (Eds.), *Open and Big Data Management and Innovation*, 63–80. Berlin: Springer International Publishing.

Baur, D. G., Hong, K., & Lee, A. D. (2018). Bitcoin: Medium of Exchange or Speculative Assets? *Journal of International Financial Markets, Institutions and Money*, *54*, 177–189. https://doi.org/10.1016/j.intfin.2017.12.004

Bech, M. L., & Garratt, R. (2017). Central Bank Cryptocurrencies. *SSRN Scholarly Paper ID 3041906*.

Berg, C., Davidson, S., & Potts, J. (2019). Blockchain Technology as Economic Infrastructure: Revisiting the Electronic Markets Hypothesis. *Frontiers in Blockchain*, *2*. https://doi.org/10.3389/fbloc.2019.00022

Boell, S. K., & Cecez-Kecmanovic, D. (2015). On being 'systematic' in literature reviews. In Willcocks, L. P ., Sauer, C., & Lacity, M. C. (Eds.), *Formulating Research Methods for Information Systems: Volume 2,* 48–78. London: Palgrave Macmillan UK.

Bonneau, J., Miller, A., Clark, J., Narayanan, A., Kroll, J. A., & Felten, E. W. (2015). SoK: Research Perspectives and Challenges for Bitcoin and Cryptocurrencies. *2015 IEEE Symposium on Security and Privacy*, 104–121. https://doi.org/10.1109/SP.2015.14

Bouri, E., Azzi, G., & Dyhrberg, A. H. (2017). On the Return-Volatility Relationship in The Bitcoin Market Around the Price Crash of 2013. *Economics - The Open-Access, Open-Assessment E-Journal*, *11*, 1–16.

Bouri, E., Gupta, R., Lau, C. K. M., Roubaud, D., & Wang, S. (2018). Bitcoin and

global financial stress: A copula-based approach to dependence and causality in the quantiles. *The Quarterly Review of Economics and Finance*, *69*, 297–307.

Bouri, E., Molnár, P., Azzi, G., Roubaud, D., & Hagfors, L. I. (2017). On The Hedge and Safe Haven Properties of Bitcoin: Is It Really More than a Diversifier? *Finance Research Letters*, *20*, 192–198. https://doi.org/10.1016/j.frl.2016.09.025

Briere, M., Oosterlinck, K., & Szafarz, A. (2013). Virtual currency, tangible return: Portfolio diversification with bitcoins ULB–Universite Libre de Bruxelles. *Working Papers CEB, 13-031*.

Brito, J., Shadab, H. B., & Castillo O'Sullivan, A. (2015). Bitcoin Financial Regulation: Securities, Derivatives, Prediction Markets, and Gambling. *SSRN Scholarly Paper ID 2423461*.

Buhalis, D., Harwood, T., Bogicevic, V., Viglia, G., Beldona, S., & Hofacker, C. (2019). Technological Disruptions in Services: Lessons from Tourism and Hospitality. *Journal of Service Management*, *30*(4), 484–506.

Bulut, A. (2018). Cryptocurrencies in the New Economy. *Journal of International Trade, Logistics and Law*, *4*(2), 45–52.

Bunjaku, F., Gorgieva-Trajkovska, O., & Miteva-Kacarski, E. (2017). Cryptocurrencies – Advantages and Disadvantages. *Journal of Economics*, *2*(1), 31-39.

Burniske, C., & White, A. (2017). Bitcoin: Ringing the bell for a new asset class. *Ark Invest (January 2017) Https://Research. Ark-Invest. Com/Hubfs/1_Download_Files_ ARK-Invest/White_Papers/Bitcoin-Ringing-The-Bell-For-A-New-Asset-Class. Pdf*.

Button, S. (2018). Cryptocurrency and Blockchains in Emerging Economies. *Software Quality Professional*, *20*(3).

Calcaterra, C., Kaal, W. A., & Rao, V. (2020). Stable Cryptocurrencies. *Washington University Journal of Law & Policy*, *61*, 193-228.

Campbell-Verduyn, M.. (2017). Conclusion: Towards a Block Age or Blockages of Global Governance? In Tendulkar, S (Ed). *Bitcoin and Beyond,* 178–197. London: Routledge.

Catalini, C., & Gans, J. S. (2016). *Some Simple Economics of the Blockchain*. https://doi.org/10.2139/ssrn.2874598

Cennamo, C., Marchesi, C., & Meyer, T. (2020). Two Sides of The Same Coin? Decentralized Versus Proprietary Blockchains and The Performance of Digital Currencies. *Academy of Management Discoveries, 6*(3). https://doi.org/10.5465/amd.2019.0044.

Cerqueti, R., Giacalone, M., & Mattera, R. (2020). Skewed Non-Gaussian GARCH Models for Cryptocurrencies Volatility Modelling. *Information Sciences*, *527*, 1–26. https://doi.org/10.1016/j.ins.2020.03.075

Charfeddine, L., Benlagha, N., & Maouchi, Y. (2020). Investigating the Dynamic Relationship Between Cryptocurrencies and Conventional Assets: Implications for Financial Investors. *Economic Modelling*, *85*, 198-217.

http://journal.uinjkt.ac.id/index.php/etikonomi
DOI: htttp://doi.org/10.15408/etk.v20i1.16911

Chapron, G. (2017). The Environment Needs Cryptogovernance. *Nature News*, *545*(7655), 403–405.

Chohan, U. W. (2017). The Double Spending Problem and Cryptocurrencies. *SSRN Scholarly Paper ID 3090174*.

Clark, B., & Burstall, R. (2018). Blockchain, IP and The Pharma Industry—How Distributed Ledger Technologies Can Help Secure the Pharma Supply Chain. *Journal of Intellectual Property Law & Practice*, *13*(7), 531–533.

Cocco, L., Concas, G., & Marchesi, M. (2017). Using an artificial financial market for studying a cryptocurrency market. *Journal of Economic Interaction and Coordination*, *12*(2), 345–365. https://doi.org/10.1007/s11403-015-0168-2

Conti, M., Sandeep Kumar, E., Lal, C., & Ruj, S. (2018). A Survey on Security and Privacy Issues of Bitcoin. *IEEE Communications Surveys Tutorials*, *20*(4), 3416–3452. https://doi.org/10.1109/COMST.2018.2842460

Corbet, S., Lucey, B., Urquhart, A., & Yarovaya, L. (2019). Cryptocurrencies as a Financial Asset: A Systematic Analysis. *International Review of Financial Analysis*, *62*, 182–199. https://doi.org/10.1016/j.irfa.2018.09.003

Courtois, N. T., Grajek, M., & Naik, R. (2014). The Unreasonable Fundamental Incertitudes Behind Bitcoin Mining. *ArXiv:1310.7935 [Cs]*. http://arxiv.org/abs/1310.7935

Cronin, P., Ryan, F., & Coughlan, M. (2008). Undertaking a Literature Review: A Step-by-Step Approach. *British Journal of Nursing*, *17*(1), 38–43.

Crosby, M., Pattanayak, P., Verma, S., & Kalyanaraman, V. (2016). Blockchain technology: Beyond bitcoin. *Applied Innovation*, *2*(6–10), 7-19.

Dashkevich, N., Counsell, S., & Destefanis, G. (2020). Blockchain Application for Central Banks: A Systematic Mapping Study. *IEEE Access*, *8*, 139918–139952.

Demidenko, D. S., Malevskaia-Malevich, E. D., & Dubolazova, Y. A. (2018). ISO as a Real Source of Funding. Pricing issues. *2018 International Conference on Information Networking (ICOIN)*, 622–625. https://doi.org/10.1109/ICOIN.2018.8343193

Dimitrova, V., Fernández-Martínez, M., Sánchez-Granero, M. A., & Segovia, J. E. T. (2019). Some Comments on Bitcoin Market (In)Efficiency. *PLOS ONE*, *14*(7), e0219243. https://doi.org/10.1371/journal.pone.0219243

Dodd, N. (2018). The Social Life of Bitcoin. *Theory, Culture and Society*, *35*(3), 35–56. https://doi.org/10.1177/0263276417746464

Dorfleitner, G., & Lung, C. (2018). Cryptocurrencies from The Perspective of Euro Investors: A Re-examination of Diversification Benefits and a New Day-of-The-Week Effect. *Journal of Asset Management*, *19*(7), 472–494.

Dostov, V., & Shust, P. (2014). Cryptocurrencies: An unconventional Challenge to The AML/CFT Regulators? *Journal of Financial Crime*, *21*(3), 249–263.

Duque, J. J. (2020). State Involvement in Cryptocurrencies. A Potential World Money? *The Japanese Political Economy*, *46*(1), 65–82.

Dyhrberg, A. H., Foley, S., & Svec, J. (2018). How Investible is Bitcoin? Analyzing The Liquidity and Transaction Costs of Bitcoin Markets. *Economics Letters*, *171*, 140–143. https://doi.org/10.1016/j.econlet.2018.07.032

Fabian, B., Ermakova, T., & Sander, U. (2016). Anonymity in Bitcoin—The Users' Perspective. *ICIS 2016 Proceedings*.

Fadeyi, O., Krejcar, O., Maresova, P., Kuca, K., Brida, P., & Selamat, A. (2020). Opinions on Sustainability of Smart Cities in the Context of Energy Challenges Posed by Cryptocurrency Mining. *Sustainability*, *12*(1), 169. https://doi.org/10.3390/su12010169

Fantacci, L. (2019). Cryptocurrencies and the Denationalization of Money. *International Journal of Political Economy*, *48*(2), 105–126. https://doi.org/10.1080/08911916.2019.1624319

Flori, A. (2019). Cryptocurrencies In Finance: Review and Applications. *International Journal of Theoretical and Applied Finance*, *22*(5), 1–22.

Foley, S., Karlsen, J. R., & Putniņš, T. J. (2019). Sex, Drugs, and Bitcoin: How Much Illegal Activity Is Financed through Cryptocurrencies? *The Review of Financial Studies*, *32*(5), 1798–1853. https://doi.org/10.1093/rfs/hhz015

García-Medina, A., & Hernández, J. B. (2020). Network Analysis of Multivariate Transfer Entropy of Cryptocurrencies in Times of Turbulence. *Entropy*, *22*(7), 760-762. https://doi.org/10.3390/e22070760

Glaser, F., & Bezzenberger, L. (2015). Beyond Cryptocurrencies—A Taxonomy of Decentralized Consensus Systems. *SSRN Scholarly Paper ID 2605803*.

Gott, M., Ward, S., Gardiner, C., Cobb, M., & Ingleton, C. (2011). A Narrative Literature Review of The Evidence Regarding The Economic Impact of Avoidable hospitalizations Amongst Palliative Care Patients in The UK. *Progress in Palliative Care*, *19*(6), 291–298. https://doi.org/10.1179/1743291X11Y.0000000014

Guadamuz, A., & Marsden, C. (2015). Blockchains and Bitcoin: Regulatory Responses to Cryptocurrencies. *First Monday, 20*(12). https://doi.org/10.5210/fm.v20i12.6198

Gurrib, I., Kweh, Q. L., Nourani, M., & Ting, I. W. K. (2019). Are Cryptocurrencies Affected by Their Asset Class Movements or News Announcements? *Malaysian Journal of Economic Studies*, *56*(2), 201–225. https://doi.org/10.22452/MJES.vol56no2.2

Härdle, W. K., Harvey, C. R., & Reule, R. C. G. (2020). Understanding Cryptocurrencies. *Journal of Financial Econometrics*, *18*(2), 181–208. https://doi.org/10.1093/jjfinec/nbz033

Harvey, J., & Branco-Illodo, I. (2020). Why Cryptocurrencies Want Privacy: A Review of Political Motivations and Branding Expressed in "Privacy Coin" Whitepapers. *Journal of Political Marketing*, *19*(1–2), 107–136.

Hashemi Joo, M., Nishikawa, Y., & Dandapani, K. (2019). Cryptocurrency, a Successful Application of Blockchain Technology. *Managerial Finance*, *46*(6), 715–733.

http://journal.uinjkt.ac.id/index.php/etikonomi
DOI: htttp://doi.org/10.15408/etk.v20i1.16911

Hayes, A. (2015). A Cost of Production Model for Bitcoin. *Working Papers No. 1505. New School for Social Research, Department of Economics*.

Herskind, L., Katsikouli, P., & Dragoni, N. (2020). Privacy and Cryptocurrencies—A Systematic Literature Review. *IEEE Access*, *8*, 54044–54059.

Hong, K. (2017). Bitcoin as an alternative investment vehicle. *Information Technology and Management*, *18*(4), 265–275. https://doi.org/10.1007/s10799-016-0264-6

Houy, N. (2014). The economics of Bitcoin transaction fees. *Working Papers Halshs-00951358*.

Hsieh, Y.-Y., Vergne, J.-P., Anderson, P., Lakhani, K., & Reitzig, M. (2018). Bitcoin and the Rise of Decentralized Autonomous Organizations. *Journal of Organization Design*, *7*(1), 14. https://doi.org/10.1186/s41469-018-0038-1

Hu, A., Parlour, C. A., & Rajan, U. (2018). Cryptocurrencies: Stylized Facts on a New Investible Instrument. *SSRN Scholarly Paper ID 3182113*.

Hudson, R., & Urquhart, A. (2019). Technical Trading and Cryptocurrencies. *Annals of Operations Research*, *297*, 191-220. https://doi.org/10.1007/s10479-019-03357-1.

Hughes, S., & Middlebrook, S. (2014). Regulating Cryptocurrencies in the United States: Current Issues and Future Directions. *William Mitchell Law Review*, *40*(2), 814–848.

Ibba, S., Pinna, A., Baralla, G., & Marchesi, M. (2018). ICOs Overview: Should Investors Choose an ICO Developed with the Lean Startup Methodology? In Garbajosa, J., Wang, X., & Aguiar, A. (Eds.), *Agile Processes in Software Engineering and Extreme Programming,* 293–308. Berlin: Springer International Publishing.

Jaag, C., & Bach, C. (2015). Cryptocurrencies: New Opportunities for Postal Financial Services. *Working Paper No. 0052.*

Kaponda, K. (2019). An Investigation into the State of Cryptocurrencies and Regulatory Challenges in Zambia. *SSRN Scholarly Paper ID 3433153*.

Karpan, A. (2019). *Cryptocurrencies and Blockchain Technology*. New York: Greenhaven Publishing LLC.

Katsiampa, P. (2017). Volatility Estimation for Bitcoin: A Comparison of GARCH Models. *Economics Letters*, *158*, 3–6. https://doi.org/10.1016/j.econlet.2017.06.023

Keogh, J. G., Dube, L., Rejeb, A., Hand, K. J., Khan, N., & Dean, K. (2020). The Future Food Chain: Digitization as an Enabler of Society 5.0. In Detwiler, D. (Ed.), *Building the Future of Food Safety Technology*. Netherlands: Elsevier.

Keogh, J. G., Rejeb, A., Khan, N., Dean, K., & Hand, K. J. (2020). Blockchain and GS1 Standards in the Food Chain: A Review of the Possibilities and Challenges. In Detwiler, D. (Ed.), *Building the Future of Food Safety Technology*. Netherlands: Elsevier.

Kerr, J. (2018). How Can Legislators Protect Sport from the Integrity Threat Posed by Cryptocurrencies? *The International Sports Law Journal*, *18*(1), 79–97.

Kfir, I. (2020). Cryptocurrencies, National Security, Crime and Terrorism. *Comparative Strategy*, *39*(2), 113–127. https://doi.org/10.1080/01495933.2020.1718983

Kim, S. (2018). Chapter Two—Blockchain for a Trust Network Among Intelligent Vehicles. In Raj, P., & Deka, G. C. (Eds.), *Advances in Computers,* Vol. 111, 43–68. Netherlands: Elsevier.

Kolber, A. J. (2018). Not-So-Smart Blockchain Contracts and Artificial Responsibility. *Stanford Technology Law Review*, *21*, 198. https://heinonline.org/HOL/Page?handle=hein.journals/stantlr21&id=198&div=&collection=

Korpela, K., Hallikas, J., & Dahlberg, T. (2017). Digital Supply Chain Transformation toward Blockchain Integration. *Proceedings of the 50th Hawaii International Conference on System Sciences.*

Lanko, A., Vatin, N., & Kaklauskas, A. (2018). Application of RFID Combined with Blockchain Technology in Logistics of Construction Materials. *MATEC Web of Conferences*, *170*, 03032. https://doi.org/10.1051/matecconf/201817003032

Larios-Hernández, G. J. (2017). Blockchain Entrepreneurship Opportunity in The Practices of The Unbanked. *Business Horizons*, *60*(6), 865–874.

Lerer, M., & McGarrigle, C. (2018). Art in the Age of Financial Crisis. *Visual Resources*, *34*(1–2), 1–12. https://doi.org/10.1080/01973762.2018.1455355

Lim, I.-K., Kim, Y.-H., Lee, J.-G., Lee, J.-P., Nam-Gung, H., & Lee, J.-K. (2014). The Analysis and Countermeasures on Security Breach of Bitcoin. In Murgante, B., Misra, S., Rocha, A. M. A. C., Torre, C., Rocha, J. G., Falcão, M. I., Taniar, D., Apduhan, B. O., & Gervasi, O. (Eds.), *Computational Science and Its Applications – ICCSA 2014,* 720–732. Berlin: Springer International Publishing.

Lu, Q., Xu, X., Liu, Y., Weber, I., Zhu, L., & Zhang, W. (2019). uBaaS: A Unified Blockchain as a Service Platform. *Future Generation Computer Systems*, *101*, 564–575.

Marian, O. (2013). Are Cryptocurrencies Super Tax Havens? *Michigan Law Review First Impressions*, *112*(1), 38–48. https://repository.law.umich.edu/mlr_fi/vol112/iss1/2

Marquez-Velazquez, A. (2010). The Report of the Stiglitz Commission: A Summary and Comment. *SSRN Scholarly Paper ID 2196125*.

Maurer, B., Nelms, T. C., & Swartz, L. (2013). "When Perhaps the Real Problem is Money Itself!": The Practical Materiality of Bitcoin. *Social Semiotics*, *23*(2), 261–277. https://doi.org/10.1080/10350330.2013.777594

Mendoza-Tello, J. C., Mora, H., Pujol-López, F. A., & Lytras, M. D. (2018). Social Commerce as a Driver to Enhance Trust and Intention to Use Cryptocurrencies for Electronic Payments. *IEEE Access*, *6*, 50737–50751.

Mendoza-Tello, J. C., Mora, H., Pujol-López, F. A., & Lytras, M. D. (2019). Disruptive Innovation of Cryptocurrencies in Consumer Acceptance and Trust. *Information Systems and E-Business Management*, *17*(2), 195–222.

Michelman, P. (2017). Seeing Beyond the Blockchain Hype. *MIT Sloan Management Review*, *58*(4), 17-20.

Miller, P. (2016). Chapter 1—The Cryptocurrency Enigma. In Sammons, J. (Ed.), *Digital Forensics,* 1–25. Syngress. https://doi.org/10.1016/B978-0-12-804526-8.00001-0

http://journal.uinjkt.ac.id/index.php/etikonomi
DOI: htttp://doi.org/10.15408/etk.v20i1.16911

Milne, A. (2018). Cryptocurrencies from an Austrian Perspective. In Godart-van der Kroon, A., & Vonlanthen, P. (Eds.), *Banking and Monetary Policy from the Perspective of Austrian Economics,* 223–257. Berlin: Springer International Publishing.

Momtaz, P. P. (2019). The Pricing and Performance of Cryptocurrency. *The European Journal of Finance*, 1–14. https://doi.org/10.1080/1351847X.2019.1647259

Nakamoto, S. (2008). Bitcoin: A Peer-to-Peer Electronic Cash System. *Satoshi Nakamoto Institute Working Paper*. Retrieved from: http://nakamotoinstitute.org/bitcoin/

Ng, D., & Griffin, P. (2018). The wider impact of a national cryptocurrency. *Global Policy*, 1–18. https://ink.library.smu.edu.sg/lkcsb_research/5880

Nica, O., Piotrowska, K., & Schenk-Hoppé, K. R. (2017). Cryptocurrencies: Economic Benefits and Risks. *SSRN Scholarly Paper ID 3059856*.

Omane-Adjepong, M., & Alagidede, I. P. (2020). High- and Low-Level Chaos in The Time and Frequency Market Returns of Leading Cryptocurrencies and Emerging Assets. *Chaos, Solitons & Fractals*, *132*, 109563. https://doi.org/10.1016/j.chaos.2019.109563

Omane-Adjepong, M., Alagidede, P., & Akosah, N. K. (2019). Wavelet Time-Scale Persistence Analysis of Cryptocurrency Market Returns and Volatility. *Physica A: Statistical Mechanics and Its Applications*, *514*, 105–120.

Peters, G. W., Panayi, E., & Chapelle, A. (2015). Trends in Crypto-Currencies and Blockchain Technologies: A Monetary Theory and Regulation Perspective. *Journal of Financial Perspectives*, *3*(3), 92-113.

Pinna, A., Tonelli, R., Orrú, M., & Marchesi, M. (2018). A Petri Nets Model for Blockchain Analysis. *The Computer Journal*, *61*(9), 1374–1388.

Platanakis, E., Sutcliffe, C., & Urquhart, A. (2018). Optimal vs Naïve Diversification in Cryptocurrencies. *Economics Letters*, *171*, 93–96.

Polasik, M., Piotrowska, A. I., Wisniewski, T. P., Kotkowski, R., & Lightfoot, G. (2015). Price Fluctuations and the Use of Bitcoin: An Empirical Inquiry. *International Journal of Electronic Commerce*, *20*(1), 9–49. https://doi.org/10.1080/10864415.2016.1061413

Pournader, M., Shi, Y., Seuring, S., & Koh, S. C. L. (2020). Blockchain Applications in Supply Chains, Transport and Logistics: A Systematic Review of the Literature. *International Journal of Production Research*, *58*(7), 2063–2081.

Raymaekers, W. (2015). Cryptocurrency Bitcoin: Disruption, Challenges and Opportunities. *Journal of Payments Strategy & Systems*, *9*(1), 30–46.

Rehman, M. H. ur, Salah, K., Damiani, E., & Svetinovic, D. (2019). Trust in Blockchain Cryptocurrency Ecosystem. *IEEE Transactions on Engineering Management*, 1–17.

Rejeb, A. (2018a). Blockchain Potential in Tilapia Supply Chain in Ghana. *Acta Technica Jaurinensis*, *11*(2), 104–118.

Rejeb, A. (2018b). Halal Meat Supply Chain Traceability Based on HACCP , Blockchain and Internet of Things. *Acta Technica Jaurinensis*, *11*(4), 1–30. https://doi.org/10.14513/actatechjaur.v11.n1.000

Rejeb, A., & Bell, L. (2019). Potentials of Blockchain for Healthcare: Case of Tunisia. *World Scientific News*, *136*, 173–193.

Rejeb, A., Keogh, J. G., & Treiblmaier, H. (2019a). Leveraging the Internet of Things and Blockchain Technology in Supply Chain Management. *Future Internet*, *11*(7), 161. https://doi.org/10.3390/fi11070161

Rejeb, A., Keogh, J. G., & Treiblmaier, H. (2019b). The impact of blockchain on medical tourism. *WeB2019 Workshop on E-Business*, 1–12.

Rejeb, A., & Rejeb, K. (2019). Blockchain Technology in Tourism: Applications and Possibilities. *World Scientific News*, *137*, 119–144.

Rejeb, A., & Rejeb, K. (2020). Blockchain and supply chain sustainability. *Logforum*, *16*(3), 363–372. https://doi.org/10.17270/J.LOG.2020.467

Rejeb, A., Sűle, E., & Keogh, J. G. (2018). Exploring new technologies in procurement. *Transport & Logistics: The International Journal*, *18*(45), 76–86.

Ricciardi, V. (2004). A Risk Perception Primer: A Narrative Research Review of the Risk Perception Literature in Behavioral Accounting and Behavioral Finance. *SSRN Scholarly Paper ID 566802*.

Richards, T., & Briefing, A. B. E. (2018). Cryptocurrencies and Distributed Ledger Technology. *Australian Business Economists Briefing, Sydney*, *26*.

Rowan, S., Clear, M., Gerla, M., Huggard, M., & Goldrick, C. M. (2017). Securing Vehicle to Vehicle Communications using Blockchain through Visible Light and Acoustic Side-Channels. *ArXiv:1704.02553 [Cs]*. http://arxiv.org/abs/1704.02553

Scharding, T. (2019). National Currency, World Currency, Cryptocurrency: A Fichtean Approach to the Ethics of Bitcoin. *Business and Society Review*, *124*(2), 219–238.

Searing, J. M., & MacLeod, D. (2019). Cryptocurrency Gift Strategies for Not-for-Profits: Here's What Organizations Should Consider as They Ponder Whether and How to Accept Donations of Virtual Currency. *Journal of Accountancy*, *227*(2), 34-36.

Shahzad, F., Xiu, G., Wang, J., & Shahbaz, M. (2018). An Empirical Investigation on the Adoption of Cryptocurrencies Among the People of Mainland China. *Technology in Society*, *55*, 33–40. https://doi.org/10.1016/j.techsoc.2018.05.006

Sharma, A. K., & Kumar, S. (2010). Economic Value Added (EVA)—Literature Review and Relevant Issues. *International Journal of Economics and Finance*, *2*(2), 200-220.

Sharma, D. K., Pant, S., Sharma, M., & Brahmachari, S. (2020). Chapter 13 - Cryptocurrency Mechanisms for Blockchains: Models, Characteristics, Challenges, and Applications. In Krishnan, S., Balas, V. E., Julie, E. G., Robinson, Y. H., Balaji, S., & Kumar, R. (Eds.), *Handbook of Research on Blockchain Technology,* 323–348. Academic Press. https://doi.org/10.1016/B978-0-12-819816-2.00013-7

Söderlund, P., & Kestilä-Kekkonen, E. (2014). Economic Voting in Finland Before and After an Economic Crisis. *Acta Politica*, *49*(4), 395–412.

http://journal.uinjkt.ac.id/index.php/etikonomi
DOI: htttp://doi.org/10.15408/etk.v20i1.16911

Srokosz, W., & Kopciaski, T. (2015). Legal and Economic Analysis of The Cryptocurrencies Impact on The Financial System Stability. *Journal of Teaching and Education*, *4*(2), 619–627.

Sudzina, F. (2018). Distribution of Foreign Aid in Cryptocurrencies: Initial Considerations. *International Advances in Economic Research*, *24*(4), 387–388.

Symitsi, E., & Chalvatzis, K. J. (2018). Return, Volatility and Shock Spillovers of Bitcoin with Energy and Technology Companies. *Economics Letters*, *170*, 127–130. https://doi.org/10.1016/j.econlet.2018.06.012

Tama, B. A., Kweka, B. J., Park, Y., & Rhee, K.-H. (2017). A Critical Review of Blockchain and Its Current Applications. *2017 International Conference on Electrical Engineering and Computer Science (ICECOS)*, 109–113.

Till, B. M., Peters, A. W., Afshar, S., & Meara, J. G. (2017). From Blockchain Technology to Global Health Equity: Can Cryptocurrencies Finance Universal Health Coverage? *BMJ Global Health*, *2*(4), e000570. https://doi.org/10.1136/bmjgh-2017-000570

Trautman, L. J. (2014). Virtual Currencies; Bitcoin & What Now After Liberty Reserve, Silk Road, and Mt. Gox? *Richmond Journal of Law and Technology*, *20*(4), 1-108.

Treiblmaier, H. (2018). The Impact of The Blockchain on The Supply Chain: A Theory-Based Research Framework and a Call for Action. *Supply Chain Management: An International Journal*, *23*(6), 545–559. https://doi.org/10.1108/SCM-01-2018-0029

Treiblmaier, H. (2019). Combining Blockchain Technology and the Physical Internet to Achieve Triple Bottom Line Sustainability: A Comprehensive Research Agenda for Modern Logistics and Supply Chain Management. *Logistics*, *3*(1), 1–13.

Treiblmaier, H., Rejeb, A., & Strebinger, A. (2020). Blockchain as a Driver for Smart City Development: Application Fields and a Comprehensive Research Agenda. *Smart Cities*, *3*(3), 853–872. https://doi.org/10.3390/smartcities3030044

Truby, J. (2018). Decarbonizing Bitcoin: Law and Policy Choices for Reducing the Energy Consumption of Blockchain Technologies and Digital Currencies. *Energy Research & Social Science*, *44*, 399–410.

Tucker, T. (2013, December 5). Bitcoin's Volatility Problem: Why Today's Selloff Won't Be the Last. *Bloomberg.Com*. https://www.bloomberg.com/news/articles/2013-12-05/bitcoins-volatility-problem-why-todays-selloff-wont-be-the-last

Uddin, M. A., Stranieri, A., Gondal, I., & Balasurbramanian, V. (2019). A Lightweight Blockchain Based Framework for Underwater IoT. *Electronics*, *8*(12), 1552. https://doi.org/10.3390/electronics8121552

Vandezande, N. (2017). Virtual Currencies Under EU Anti-money Laundering Law. *Computer Law & Security Review*, *33*(3), 341–353.

Vaz, J., & Brown, K. (2020). Sustainable Development and Cryptocurrencies as Private Money. *Journal of Industrial and Business Economics*, *47*(1), 163–184. https://doi.org/10.1007/s40812-019-00139-5

Vidal-Tomás, D., Ibáñez, A. M., & Farinós, J. E. (2019). Weak efficiency of the cryptocurrency market: A market portfolio approach. *Applied Economics Letters*, *26*(19), 1627–1633. https://doi.org/10.1080/13504851.2019.1591583

Vincent, O., & Evans, O. (2019). Can Cryptocurrency, Mobile Phones, and Internet Herald Sustainable Financial Sector Development in Emerging Markets? *Journal of Transnational Management*, *24*(3), 259–279.

Volosovych, S., & Baraniuk, Y. (2018). Tax control of cryptocurrency transactions in Ukraine. *Banks and Bank Systems*, *13*(2), 89–106. https://www.ceeol.com/search/article-detail?id=696926

Wang, G. (2019). Marx's Monetary Theory and Its Practical Value. *China Political Economy*, *2*(2), 182–200. https://doi.org/10.1108/CPE-10-2019-0026

Wang, J., Wu, P., Wang, X., & Shou, W. (2017). The Outlook of Blockchain Technology for Construction Engineering Management. *Frontiers of Engineering Management*, *4*(1), 67–75. https://doi.org/10.15302/J-FEM-2017006

Wang, Y., Singgih, M., Wang, J., & Rit, M. (2019). Making Sense of Blockchain Technology: How Will It Transform Supply Chains? *International Journal of Production Economics*, *211*, 221–236. https://doi.org/10.1016/j.ijpe.2019.02.002

Wei, Q., Li, S., Li, W., Li, H., & Wang, M. (2019). Decentralized Hierarchical Authorized Payment with Online Wallet for Blockchain. In Biagioni, E. S., Zheng, Y., & Cheng, S (Eds.), *Wireless Algorithms, Systems, and Applications,* 358–369. Berlin: Springer.

Wet, J. H. v H. D. (2005). EVA versus traditional accounting measures of performance as drivers of shareholder value—A comparative analysis. *Meditari : Research Journal of the School of Accounting Sciences*, *13*(2), 1–16.

Wetherell, M., & Potter, J. (1992). *Mapping the Language of Racism: Discourse and the Legitimation of Exploitation*. London and New York: Harvester Wheatsheaf and Columbia University Press.

Wilson, C. (2019). Cryptocurrencies: The Future of Finance? In Yu, F-L. T., & Kwan, D. S. (Eds.). *Contemporary Issues in International Political Economy,* 359–394. Berlin: Springer.

Yalaman, G. Ö., & Yıldırım, H. (2019). Cryptocurrency and Tax Regulation: Global Challenges for Tax Administration. In Hacioglu, U (Ed.), *Blockchain Economics and Financial Market Innovation: Financial Innovations in the Digital Age,* 407–422. Berlin: Springer International Publishing.

Zhang, J. Y. (2017). The Rise of Market Concentration and Rent Seeking in the Financial Sector. *John M. Olin Center for Law, Economics, and Business Fellows' Discussion Paper Series*.

Zook, M. A., & Blankenship, J. (2018). New Spaces of Disruption? The Failures of Bitcoin and the Rhetorical Power of Algorithmic Governance. *Geoforum*, *96*, 248–255. https://doi.org/10.1016/j.geoforum.2018.08.023

http://journal.uinjkt.ac.id/index.php/etikonomi
DOI: htttp://doi.org/10.15408/etk.v20i1.16911