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# A Call for Research: Cryptocurrencies as a Disruptive Technology for Governments, Organizations, and Society

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## Abstract.

With the potential for significant effects on financial systems, societal order, and organizational strategy, cryptocurrencies and blockchain technologies stand as a potentially major disruptive force (Rossi, et al., 2019). As such, Information Systems Research should focus resources on this still emerging technology. The objective of this research is to identify and analyze what research has found since these technologies have emerged in the last decade. An inductive study was conducted where articles from the AIS Basket of 8 journal list in the domain of cryptocurrencies and blockchain were examined and categorized into emergent themes. These themes were analyzed and supplemented with other research. Resultantly, the ramifications for future trends in research were discussed.

**Keywords:** Cryptocurrencies, Blockchain, Literature Review.

## 1 Introduction

With a total market cap in the trillions of dollars and exponential growth in the last two years (bitcoin.org, 2022), the impact of cryptocurrencies on economic markets and governments' fiscal policy cannot be overstated. Indeed, the total market cap of cryptocurrencies has grown by over 1000% in the last 24 months alone (bitcoin.org, 2022). Though known for severe volatility in valuation, cryptocurrency growth has recently begun to align with market indexes such as the Dow Jones and S&P 500.

Cryptocurrencies, such as Bitcoin, Ethereum, and Litecoin, are defined as virtual currencies that are based on blockchain technology and secured by cryptography. Blockchain technology itself is a specific type of database in which the information is stored in blocks. Moreover, these blocks are chained together (Convey, 2021; Frankfield, 2021). Cryptocurrency is a blockchain-based payment network, which is considered to be an information system (Serapiglia, et. al., 2015).

The specific type of database that is called blockchain is maintained by the nodes, which are computers. The computers validate the transactions and therefore upkeep the payment network based on the blockchain. While validating the transactions in a blockchain the computers are rewarded the specific cryptocurrency to compensate

their electricity costs. The computers validating the transactions are called miners. The existence of these miners utilizing their computing power is the requirement for the functional payment network, which can validate transactions as they occur. This is one way of validating transactions in a blockchain called proof-of-work, PoW. However, there are already other existing validating methods, such as proof-of-stake. (Tschorsch & Scheuermann 2016; Conti, et. al., 2018; Pernice & Scott, 2021; Convey, 2021).

This emerging area has limited exposure in major publications. Across the eight elite journals in the AIS Basket of 8, only a handful of publications focusing on cryptocurrencies have been published. These have all been within the last two to three years. Given the potential for momentous change at the organizational, personal, and governmental sectors, further research is urgently needed (La Paz, et al., 2020). This literature review intends to highlight the themes emergent in extant literature and identify fruitful areas for future research. The body of this paper is divided into sections for each of the themes identified. The final discussion section analyzes the potential research streams and discusses future possibilities.

## 2 Methodology

As stated in the introduction, the intention of this review is to identify emerging themes and potential future research directions. The domain of the data was initially confined to the eight elite journals in the Information Systems field as defined by the Association for Information Systems. Keywords, which included cryptocurrency, bitcoin, and decentralized finance, were used to discover publications in the study domain. No date restriction was utilized but the journal was restricted to the eight journals in the AIS list. Articles that referenced the keywords only in passing were not included as relevant studies. This search revealed 19 total publications across the eight elite journals. The breakdown of the distribution of relevant articles is listed below in Table 1:

<b>Journal Name</b>	<b>Code</b>	<b>Count</b>
European Journal of Information Systems	EJIS	2
Information Systems Journal	ISJ	2
Information Systems Research	ISR	2
Journal of the AIS	JAIS	2
Journal of Information Technology	JIT	3
Journal of MIS	JMIS	6
Journal of Strategic Information Systems	JSIS	1
MIS Quarterly	MISQ	1

Table 1: Breakdown of relevant article count for major journals

The marginal number of publications in major journals is in line with a new and emerging domain. Despite this perceived reality, cryptocurrencies have been in circulation since 2009 (bitcoin.org, 2022) which means there was a decade long gap between their introduction and the first analysis in major journals. The cause for this delay could have a myriad of reasons that are beyond the scope of this paper however it is apparent that research is lagging behind the real world situation.

Once articles were determined to be relevant, they were divided into respective thematic groupings. There were four major themes and two minor themes. Themes were established as major if more than one paper fell into that thematic group. If only one paper formed a theme, it was established as a minor theme. As seen in Table 2 below, the major themes were fintech innovation, end Users (Fees, motivations, etc.), governance, and business models / strategy / integration. The minor themes were security and entrepreneurship.

<b>Themes</b>	<b>Journal Article(s) Assigned to Theme</b>					
Entrepreneurship	ISJ					
User Attitudes and Perceptions	MISQ	EJIS	EJIS			
Business Integration	JAIS	JMIS	JSIS			
Governance	JAIS	JMIS	JMIS	JMIS		
Fintech innovation	ISJ	ISR	JMIS	ISR	JMIS	JIT
Security	JIT					

Table 2: Listing of journal articles assigned to given themes

Two additional articles were found that spoke to potential research agendas in the cryptocurrency domain area. As this is a meta-theme, it was not included in any of the assigned themes. They were included in the discussion at the conclusion of the paper in a comparative analysis with our findings. The four major themes identified in Table 2 formed the basis for the breakdown of the sections below. Supporting articles outside of the group articles identified in the elite journals were included to facilitate a broader discussion.

### **3 Major Theme 1: User Attitudes and Perceptions**

For end users, there are many barriers to entry into this platform. There is significant literature that examines how trust is an ongoing issue. Comfort with the status quo of traditional banking mechanisms is a significant barrier to the realization of blockchain banking applications benefits, additional awareness of consumer privacy protections can persuade customers to use the blockchain-based applications (Raddatz, et al., 2021). The user attitudes towards information systems should be considered influential, especially when it comes to cryptocurrencies where the trusted party is the system itself. More specifically speaking the trust lies in cryptography (Serapiglia, et. al., 2015).

There are both internal and external factors identified that might affect users' attitudes of which trust is found to be the most influential one for blockchain-based technology adoption (Albayati, et. al., 2020). Further, the most influential aspects affecting the trust itself are the regulatory support, and user experience of which the first one is lagging substantially behind the development of the technology (Asheer, 2018; Cousins, et. al., 2019; Parveen & Alajmi, 2019; Albayati, et. al., 2020).

Internal factors are behavior intention, attitude, perceived usefulness, perceived ease of use, and trust. Beyond these factors, external ones identified were regulatory support, experience, social influence, and design (Albayati, et. al., 2020). The identified factors indicate the challenging business environment the developers and founders have to face while developing cryptocurrencies. The development should go far beyond the technology to meet the users' needs as a blockchain-based currency.

The trust of the users is hindered by the lack of available, easy to access knowledge regarding cryptocurrencies. Although there are hundreds and hundreds of news articles and discussion forums discussing cryptocurrencies as an alternative payment method, the information of such sources is mostly superficial and biased ultimately causing puzzlement. The rather complex blockchain technology behind cryptocurrencies is complicating the understanding further. Moreover, it is identified that the fundamental value of cryptocurrencies is still unclear, which should evoke skepticism among the people currently utilizing the cryptocurrencies (Giudici, et. al., 2020).

Security issues behind cryptocurrencies will also affect the trust of the users. There are multiple security issues identified such as double-spending, mining pool attacks, and client-side security threats regarding specifically the bitcoin (Conti, et. al., 2018). Conti *et al.* (2018) suggest that these identified bitcoin security aspects should be researched further. For individual users, the client-side security threats might be viewed as the most critical, even though the security aspects should be evaluated as a whole. The credibility of the payment system security should be based on the overall security evaluation including all the aspects. Currently, the security research is in the initial stage while new cryptocurrencies and related technologies arise. Therefore, the cryptocurrency industry, especially the users' trust viewpoint of it is still in the initial stage of evolving. At the moment it is reasonable to argue that people should have healthy skepticism whilst researching and collaborating with the cryptocurrency industry.

A final barrier to entry for end users are the fees involved with utilizing cryptocurrencies. Ilk, *et al.* (2021) found that market equilibrium forms between users who demand data space for conducting crypto-transactions while trying to avoid transaction delays, and miners who supply data space while trying to maximize fee revenues. Their findings indicated that the inelastic nature of demand signals the utility of Bitcoin as a niche platform for transactions that are otherwise difficult to conduct. Reading between the lines, this seems to support the perception that cryptocurrencies are mostly used for illicit transactions as being mostly true. Why would a user go through the trouble and cost unless there was a motivation to hide the transaction itself?

Beyond illicit transactions, there are two major drivers towards end user adoption of cryptocurrencies. One is as a new investment vehicle (Mattke, *et al.*, 2020) and the

other is as a crypto-miner (Ilk, *et al.*, 2021). It is debatable if either of these groups of people could truly be considered “end-users” as they are not using the currency for transactions. However, they are not acting as part of an organization or government for the most part so their place as stakeholders in the cryptocurrency scheme is at least ambiguous.

#### **4 Major Theme 2: Business Integration**

In Darwin’s “On the Origin of Species”, a major premise postulated was that the species that is most adaptable to change is the one that survives. The same can be said of organizations in the modern day. Cryptocurrencies and blockchain presents a potential inflection point for businesses where adaptation is critical. The adaptation in this context refers to matching the existing user requirements with the characteristics of blockchain-based cryptocurrencies. For businesses, cryptocurrencies should be cost-effective and fast compared to fiat currencies, such as EUR and USD. For individuals, customer convenience should be a priority on which to focus.

While some early studies have indicated that effectively implementing blockchain into an organization remains unknown (Du, *et al.*, 2019), other research has shown there are specific cases for potential implementation (Chong, *et al.*, 2019). These include blockchain support for businesses, replacing incumbents in the value chain, resolving inefficiencies in the value chain, revolutionizing contemporary business practices, and co-developing rival blockchain solutions to preexisting business practices (Chong, *et al.*, 2019). Furthermore, strategies for the integration of blockchain into existing businesses have been explored (Kohli & Ting-Peng, 2021).

Despite these hurdles, the growth and use of blockchain is not something that organizations can ignore. According to the Deutsche Bank (Laboure & Reid, 2020), there are currently around 50 million blockchain wallet users, and the estimations argue that there might be 200 million by 2030. Moreover, Bezhovski, *et al.* (2021) argue that the estimated usage of cryptocurrencies as an e-commerce payment method is currently less than 1%. However, the estimation that Bezhovski *et al.* (2021) make is ambiguous and should be as a directive, rather than absolute truth. The number of current wallet users and usage amount indicates that the cryptocurrencies are still in the initial phase of the adaption while fiat currencies remain dominant ones.

Regarding the lack of incentives specifically, the already existing trustworthy payment systems discourage the users from taking a step forward towards cryptocurrency payment systems. In developing countries, these incentives can be seen higher compared to the developed countries, where the financial infrastructure is more stable. For example, the lack of trust towards third parties in developing countries might inhibit growth, and therefore the adaption of cryptocurrencies (Saiedi, *et al.*, 2021). Also, hyperinflation could increase the adaption of cryptocurrencies, while citizens prefer to use cryptocurrencies over the existing legal currencies (Tu & Meredith, 2015; Denison & Martin, 2019; Saiedi, *et al.*, 2021).

The adaptation of cryptocurrencies by businesses and organizations is still in the early stages although the industry is widely noticed in the media. As more academic

literature and research will be published more precise analysis can be done relating to the speed of adaptation, and possible ways of adaptation. At a high level, cryptocurrencies as information systems should be developed substantially further by focusing especially on convenience regarding usability for both individuals and businesses.

## 5 Major Theme 3: Governance

As noted in the “User Attitudes and Perception” section, there is a high degree of probability that a significant portion of crypto transactions are illicit in nature. This results in an obvious motivation for governments to attempt to legislate and control the currency. Specifically, there are multiple legal issues to be solved regarding the taxation of cryptocurrencies, and the definition of which instrument they are considered to be. Some countries view cryptocurrencies, like bitcoin, as currencies, while some of the countries lack the specific definition of what these instruments are (Asheer, 2018; Cousins, et. al., 2019; Parveen & Alajmi, 2019).

Some countries, such as Australia, Canada, Finland, and Germany have legalized its use and have made it clear to apply normal earned income rules on Bitcoin, while many countries have yet not made a clear statement with the legalization and use of bitcoin’ (Parveen & Alajmi, 2019). Given the novelty of cryptocurrencies, it is not surprising that there is a lack of legislative clarity. This tends to limit the practical adaptation of the cryptocurrencies due to a high threshold of initiating the use of such currencies with ambiguous legislation (Asheer, 2018; Cousins, et. al., 2019; Parveen & Alajmi, 2019).

A likely cause to the slow adaptation by governments with regards to legislating cryptocurrencies is the built in anonymous nature of transactions. If it is near impossible to track who is doing what with this system, how could legislation actually be enforced? On a promising note for governments, a recent study has shown the practicality of using Machine Learning to de-anonymize the Bitcoin Blockchain to predict the type of yet-unidentified entities (Sun Yin, et al., 2019). This study was successful in their predictions and was able to predict the type of a yet-unidentified entity with an accuracy of 80.42% (Sun Yin, et al., 2019). This could provide the basis for legislation for many governments.

Other research has found that blockchain can actually assist in combating corruption in international commerce (Sarker, et al. 2021). It was found that blockchain, with its capacity to provide full transactional disclosure and thereby reduce uncertainty, insecurity, and ambiguity in transactions, has been lauded in its potential to fight against corruption. This was a surprising finding given the previously discussed issues with the very anonymous nature of cryptocurrencies.

Governance appears to be a ripe area for research given competing motivations and seemingly contradictory research. While it might seem impossible to expect governance given the nature of blockchain, there is not only the possibility for sound and effective legislation but even the potential for a positive use by way of combating corruption. At the end of the day however, the question of governance in the tradi-



tional sense may be moot given that governance in the blockchain economy might radically depart from established notions of governance (Beck, et al., 2018).

## **6 Major Theme 4: Innovation**

The primary research profile in the most prolific thematic area is the place that blockchain and cryptocurrencies have in the context of financial technologies (FinTech). At a high level, FinTech is the application of technological innovations to financial services and processes (Lagna & Ravishankar, 2022). It is often discussed alongside other innovative FinTech domains such as market trading and artificial intelligence (Hendershott, et al., 2021), payment settlement, cross-border payment services, lending and deposit services, peer-to-peer (P2P) lending, and robo-advisory (Gomber, et al., 2018).

Though no doubt an interesting perspective on innovation, it is not groundbreaking to speculate on the potential innovative disruptions that cryptocurrencies might have on the financial sector. Other less obvious innovations may occur at the environmental or societal levels. The potential for a currency unbound to governments could massively disrupt the social order. Money is the foundation for power and a decentralized money source could shatter that illusion. On the environmental side, there is a debate about the impact of cryptocurrencies on the environment.

The energy consumption in a specific cryptocurrency network is dependent on its transaction validation method. The most common validation methods currently utilized are proof-of-work and proof-of-stake of which the latter one is more efficient regarding energy consumption (Cousins, et. al., 2019). Despite, the concerns of the energy consumption among the researchers and users (Cousin, et. al., 2019), bitcoin has lower environmental costs compared to paper money, and banking systems according to the multiple studies cited in Cousins et. al. (2019). In contrast, Corbet et al. (2021) estimates that the energy footprint per bitcoin transaction is equivalent to 350,000 visa transactions. Innovation is needed to address this troubling issue in that cryptocurrencies may negatively affect the environment. Given the conflicting research, further studies are needed.

The second area of innovation is on the power structures entrenched by financial systems. Cryptocurrencies can facilitate the decentralization of power over the Internet and of governance in general (Lacity, 2022). The potential for research in the area of structures of power is enormous as no technology has enabled the potential for change in the way that cryptocurrencies and blockchain have. Further innovation in societal change can be seen in the potential for FinTech to act as an agent of positive change for the least fortunate. Lagna & Ravishankar (2022) found that business strategies for FinTech-led financial inclusion, digital artifacts of fintech-led financial inclusion, the business environment of FinTech-led financial inclusion, and microfoundations of FinTech for financial inclusion can all have a profound impact on alleviating poverty.

## 7 Discussion

Cryptocurrencies based on the promising blockchain technology are an intriguing way of payment enabling fast and cost-efficient transactions. In the perspective of information systems, cryptocurrencies require both social acceptance, and the proper technical implementation to function as a convenient payment network for its users. If one or the other is lacking the practical implications of such systems will be too restricted and require further development to meet the criteria of the society. Payment networks should be convenient, trustworthy, and vastly accepted to achieve a user base high enough to act as a currency. The more developed and sophisticated cryptocurrencies and related technologies become, the closer the vast adoption of such digital currencies are.

The future direction of the technology is uncertain while studies identify the prediction of the future of cryptocurrency as one intriguing research topic (Tschorsch & Scheuermann, 2016; Siddhart, et. al., 2020). Further, the difficulty to predict the future of cryptocurrencies is identified. Studies approach the future statements is sensitive and thought-provoking, rather than directive validating the current ambiguous atmosphere in the cryptocurrency industry, which is lacking comprehensive academic sources (Ciaian, 2016; Luther, 2016; Tschorsch & Scheuermann, 2016; Hazlett & Luther, 2020; Rehman, 2020; Siddhart, et. al., 2020).

Luther (2016) recognizes the growing electronic transactions made to affect positively the adaptation of cryptocurrencies if the blockchain-based transactions significantly reduce the costs of processing transactions. Moreover, Luther (2016) states that cryptocurrencies ‘...are unlikely to function as more than a niche money except in the unlikely event of hyperinflation or government support or both’. Trust is an important factor identified affecting the attitudes and perceptions of the future (Albayati, et al., 2020). The government support aspect identified by the Luther (2019) might solve the trust issues related to cryptocurrencies at least partly. According to the Rehman, et al. (2020) who has researched specifically about the trust of cryptocurrencies concludes that ‘achieving a highly trustworthy cryptocurrency ecosystem is not reachable within short time’.

The future of cryptocurrencies is depending not just on the development of the technology, and therefore the usability of it but also on external factors of which the main two identified in this literature review are the trust towards cryptocurrencies and the distrust towards fiat currencies. The latter one might happen due to hyperinflation, while the first one will be achieved through time, and proper research published in the future. Hyperinflation could lower the threshold of using cryptocurrencies, and therefore it could also rapidly speed up the technological development of such digital currencies as interest in the cryptocurrency would increase. The more people use cryptocurrencies the sooner it becomes a convenient currency to use through technological advancements.

The academic literature review available currently indicates that further research is in urgent need relating to cryptocurrencies. Other researchers have echoed the call for more research in the area of cryptocurrencies and blockchain technology. Themes identified in prior research include blockchain governance, human and material agen-

cy, blockchain affordances and constraints, as well as the consequences of its use (Rossi, et al., 2019). Overlaps in the findings from this inductive research can be seen including governance, end-users. However differences were found whereby affordances and constraints, and consequences are called for. The research since Rossi, et al.'s (2019) work has not fulfilled all of the themes called for. Cryptocurrencies and the related blockchain technology have a tremendous opportunity for research in both the areas called for Rossi, et al. (2019) as well as the areas identified in this work, including power structures, environmental concerns, and further governance work.

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