International Journal of Law
www.lawjournals.org
ISSN: 2455-2194
Received: 14-06-2022, Accepted: 28-06-2022, Published: 15-07-2022
Volume 8, Issue 4, 2022, Page No. 43-51

The cryptocurrencies: Its mechanism and legal challenges

Md Mahfuzur Rahman
Lecturer, Department of Law and Justice, Bangladesh Army University of Engineering and Technology, Dayarampur, Natore, Bangladesh

Abstract
This study intends to make clear some of the ambiguities around crucial perspectives of cryptocurrencies as cryptocurrencies have turned into more popular in recent years. As a result, the devotion of completing this study, which firstly aims to simplify the subject's difficult and perplexing phrases. From a conceptual, legal and technological standpoint, this article has been composed. It has been broken down into three sections: (1) the theory of cryptocurrency and the technologies that support it, along with all applicable terms and terminologies; (2) in the world of cryptocurrency, the linked mechanism and also how blockchain works, which needs simple and easy terminology and the procedure that goes in so blockchain network; (3) the lawful implications of cryptocurrencies. This section concentrates on the most challenging legal issues that this digital money raises. The legal aspect also emphasizes key results and recommendations for readers and authorities in order to help them in overcoming legal questions and achieving the technology's main objective, even while taking into consideration the risks associated with this virtual currency of exchange. In order to improve the current state of this type of technology, experts from all around the world have worked to reach and share their results, as well as their opinions and recommendations.

Keywords: anonymity, blockchain, cryptocurrency, cybersecurity, legislation

Introduction
The emergence of cryptocurrencies represented the beginning of a new era in the international economic market. During the last ten years, Bitcoin has surprised the whole economy by providing an unprecedented genre of monetary system that is fully autonomous and unlike any other current currency [1]. Satoshi Nakamoto, a person or a group of persons, proposed a novel approach of electronic payment in 2008 that uses a peer-to-peer network and a distinct decentralized ledger known as blockchain to reduce any need for a third - party provider or a middleman to manage, approve, and execute transactions. The white paper presented "Bitcoin" as the "currency" for circulating and interchange among the consumers of this modern digital system in order to optimize the influence of this new tech.
From its very inception, Bitcoin has attracted a lot of followers, particularly in the economic crisis, which changed people's perceptions of governments and banks, caused significant losses, and weakened their credibility in traditional banking. Together with the blockchain technology getting explored by the high proportion of institutions around the world, it has also suggested a different decentralized monetary system and a new business model. Cryptocurrencies are not generated by a central regulating authority, eliminating the possibility of system misuse and manipulation. Hence, the government does not have any security for the official finances in the event of a legal dispute or deception. Nations around the globe have had different views to cryptocurrencies, their development, and the potential implications [2].
This paper aims to explain the decentralized cryptocurrency mechanism. Attempting to understand how cryptocurrencies work will provide policymakers a better idea of how to entirely comprehend the cryptocurrency ecosystem and create solutions to handle and deal with it instead of ignoring it.
Furthermore, the article presents the most critical legal issues that virtual currencies face. The purpose of providing this crucial information is to provide the reader a clear perception of that kind of different and innovative virtual money, as well as the technology that enables it. The world's most famous type of cryptocurrency, "Bitcoin" is being used in research to illustrate the widely used method found in nearly all cryptocurrencies [3].

Methodology
This paper takes a qualitative research methodology in order to achieve its objectives. The researchers will be able to conduct an in-depth analysis of the relevant studies focused on the technological and legal problems facing cryptocurrencies and examine these data in order to address the research questions and accomplish the research objectives by using qualitative approach [4]. Besides that, the study relies largely on current secondary raw material like as journal papers, books, public records, statistics, and a number of other internet sources.

Cryptocurrency

"Cryptocurrency" is comprised of two parts: "crypto" and "currency" [5]. Since its introduction, cryptography science has played a key role, as reflected by the word "crypto" There are now 8,548 cryptocurrencies in existence, with a market valuation of $1,589,337,650,660 [6]. Rather, they are virtual and deposited on the web through an another electronic wallet which is only accessible by the wallet's holder, who also has access to the wallet's secret keys [7]. Bitcoin, as the founding father of other digital currencies, is open - source software, which implies that it is not possessed or controlled by a centralized business or individual [8]. Cryptocurrencies are easily accessible to everyone who desires to be a member of the system. Operators can update the bitcoin private keys in these kind of open-source software to establish their own cryptocurrency initiatives [9]. Despite the reality that there are hundreds of different cryptocurrencies on the marketplace, the great majority are based on bitcoin's basic protocol. International bodies have published reports concerning cryptocurrencies and the infrastructure that underlying them since their inception. The word "cryptocurrency," as well as other related terms, have been clarified in most of these studies. Some of the definitions provided in this regard are displayed in the following table.

Table 1: Definitions of Cryptocurrency

The International Organizations	Date	The Definition
The European Parliament	2018	A digital representation of value that (i) is intended to constitute a peer-to-peer (P2P) alternative to government-issued legal tender, (ii) is used as a general-purpose medium of exchange (independent of any central bank), (iii) is secured by a mechanism known as cryptography and (iv) can be converted into legal tender and vice versa" [10].
Financial Action Task Force (FATF)	2014	A digital representation of value that can be digitally traded and functions as (1) a medium of exchange; and/or (2) a unit of account; and/or (3) a store of value but does not have legal tender status in any jurisdiction. It is not issued nor guaranteed by any jurisdiction and fulfils the above functions only by agreement within the community of users of the virtual currency [11].

Source: Constructed by the authors based on the reports published by the World Bank, FATF.

As can be seen from the above-mentioned table, different definitions have been provided by international organisations for cryptocurrency. Despite the agreement among them that cryptocurrency represents a "digital representation of value", their definitions still have differences. For instance, the definition provided by the FATF describes cryptocurrency as "a *digital representation of value that does not enjoy a legal currency status under any existing jurisdiction."* The definitions provided by the international monetary fund, on the other hand, noted that these currencies are "*subset of virtual currencies*", created by "*private developers*" and "*denominated in their account units*." Additionally, the European parliament focused on the mechanism and the convertibility of cryptocurrencies. Hence, it can be seen from the definitions stated that these respective international organisations have failed to provide adequate and unified definition for cryptocurrency. Therefore, based on these definitions, it can be seen that the characteristics of cryptocurrency are as stated in figure 1 below:

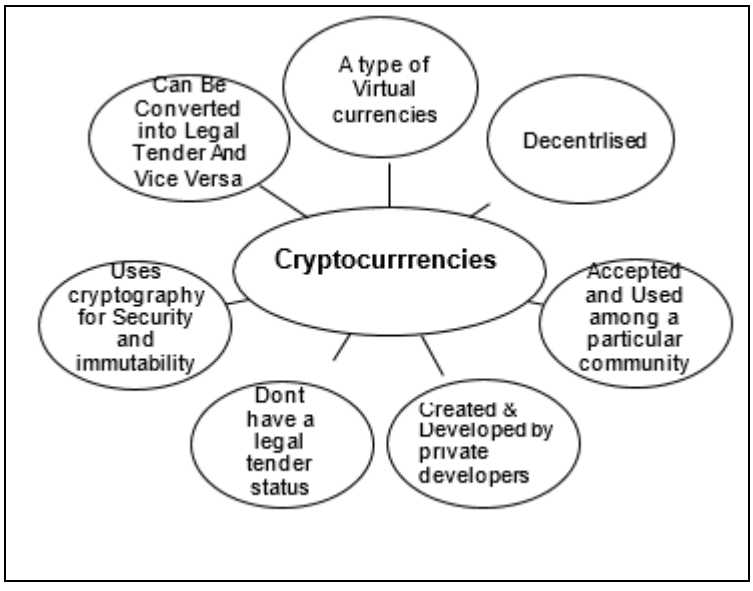

Fig 1: Cryptocurrency's characteristics constructed by the authors based on the definitions provided by the international organisations

The characteristics depicted in Figure 1 indicate the outcomes of global organizations' explanations. They named them virtual currencies cos of their intangible characteristics and absence of physical appearance, as well as their distributed nature, which implies they do not need third parties to monitor and govern their financial transaction as well as issuance of cryptocurrencies. They are well-liked by a select group of users who actually rely on them. They were derived by a private developer who had first introduced bitcoins and acknowledged their characteristics and features. Because of the adoption of blockchain systems, they are not acknowledged as official currency in any jurisdiction and thus are used as a cryptographic science, as shown in the above image. Cryptocurrency is stated by the researchers as "a convertible virtual currency created and run by a cryptographic decentralised ledger system which is not subject to the control of any central authority. It is used as a medium of exchange that does not have a legal tender status. However, cryptocurrency can be centralised and may have a legal tender status if it were to be legalised under governments' laws and regulations or is created under their authority and control".

Blockchain

The blockchain is the backbone of cryptocurrency. Blockchain has been able to attract and retain the interest of both entrepreneurs and scholars across the world due to its unique and undoubtedly clever qualities. Many reports have been published at both the regional and international levels. Several definitions for blockchain are being provided, as shown in the table below. All of these definitions have stressed on a major aspect or feature.

Table 2: Definitions of blockchain

The International Organizations	Date	The Definition
European Parliament (Europarl)	2018	"A mechanism that employs an encryption method known as cryptography and uses a set of specific mathematical algorithms to create and verify a continuously growing data structure to which data can only be added and from which existing data cannot be removed that takes the form of a chain of transaction blocks, which functions as a distributed ledger" [12].
The Organization for Economic Co-operation and Development (OECD)	2018	"A shared ledger of transactions between parties in a network, not controlled by a single central authority. You can think of a ledger like a record book: it records and stores all transactions between users in chronological order. Instead of one authority controlling this ledger (like a bank), an identical copy of the ledger is held by all users on the network, called nodes" [13].
Pricewaterhouse Coopers Advisory (PWC)	2017	"A technology that allows data to be stored and exchanged on a peer-to- peer (P2P) basis. Structurally, blockchain data can be consulted, shared and secured thanks to a consensus-based algorithm. It is used in a decentralized manner and removers the need for intermediaries, or trusted parties" [14].

Source: Constructed by the authors based on the reports published by Europarl, OECD and PWC.

Whereas the initial definition issued by the European Parliament emphasized primarily on encryption and security, the second and the third versions have placed more emphasis on the technological features of the blockchain, as well as devolution of power as well as peer-to-peer technology. As a consequence, depending on the given definitions, the researchers have defined "Blockchain" as "*a unique son of DLT that operates through a shared ledger that saves the data in blocks connected to each other, shaping a chain by relying on the unique technology of cryptography and hashing function. Cryptocurrencies' blockchain operates completely Peer-to-Peer with no need for intermediaries such as central banks and banking institutions."*

To be widely utilized, Cryptocurrency, like traditional currencies, should be stable, secure, and free from forgeries. To overcome those problems, cryptocurrency increasingly depends on cryptography to safeguard the system, regulate monetary issuance, and verify transactions [15]. The blockchain protects the information and data, namely account names and transactions. In the "Mining Process" a series of devices or nodes sends bitcoin from one computer to another in a timely manner for a reasonable rate [16].

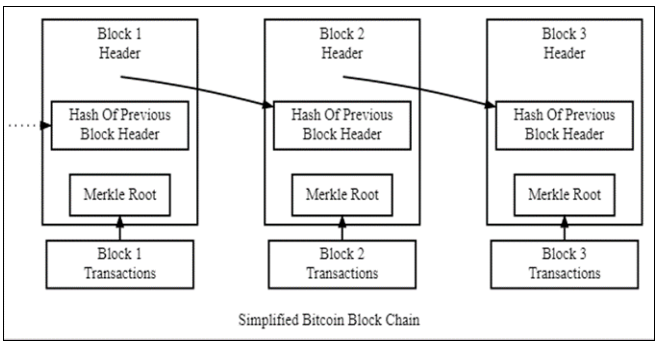

Fig 2: The blocks in the blockchain

Every transaction recorded in the bitcoin blockchain is open, as seen in [17, Figure 2]. The contents in a data block cannot be modified once it has been attached to one of the other blocks. Attempting to manipulate it will be immediately noticed. Each and every change in either block is likely to inhibit consensus with all other blocks in the blockchain, as per the so-called "cryptographic hash function" Hashing is the method of converting a non-encrypted sort of data into an encrypted one. Its task is to take an input and transform it into a string of integers, and it is especially used in its consensus mechanism

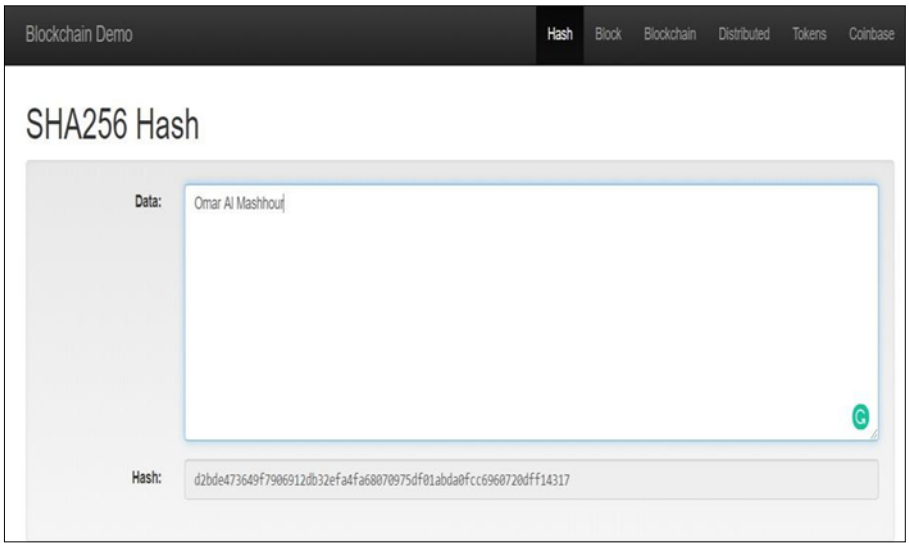

Fig 3: The crypto hash-function

The name of the input has indeed been changed to a set of numbers and letters called "digital fingerprint" as shown in [18, Figure 3]. Each transaction in the blockchain is provided a unique signature, and that each unique signing in a block helps to the signature of the following block. These linkages between the blocks form an unbreakable chain of blocks. The reader is invited to [19, Figure 4] for more info.

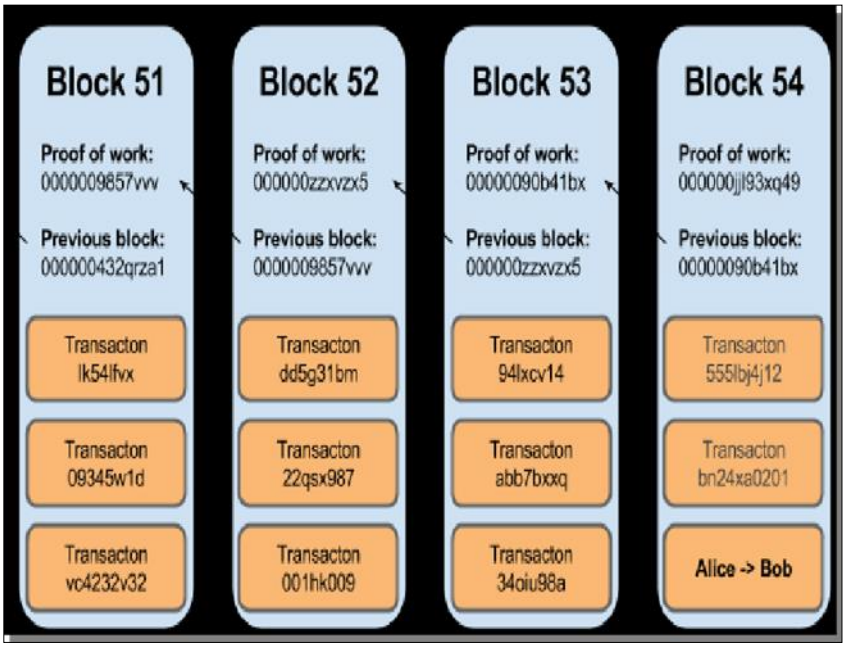

Fig 4: Cryptocurrency's Digital Signature

Mining Process

Cryptocurrencies are created using a new system that can be found on the web. Whenever a transaction takes place on the "blockchain" it transfers to the "unverified transaction pool" where all of the "unconfirmed transactions" are ready to be verified [20]. The network's validators are known as "miners" The "the mining process" [21] includes the verification of operations and their insertion to the blockchain via miners. The process of adding a purchase to the blockchain requires computing extremely difficult mathematical formulas which can only be performed by supercomputers. The word actually for this is "proof-of-work" [22]. The miner will earn rewards after formulating and solving problems, which will be deposited to his cryptocurrency wallet. Miners are credited with a percentage of the profits generated by solving the problem.

Issuance of Cryptocurrency

However, there really are two methods of obtaining cryptocurrency in the issue of cryptocurrencies. The first one is conducted by installing the software a free application termed a mining program, which becomes available to everyone. This method, however, necessitates high-end computers that are uniquely developed to fix such complex mathematical calculations and add new operations to the block. The Bitcoin application, for example, is a free app for anyone to use. The program pays the miner for solving mathematical problem by issuing a cryptocurrency or a component of one and adds it to the miner's crypto-wallet [23]. Another way of getting cryptocurrency is to create a cryptocurrency wallet upon its cryptocurrency's official website and get cryptocurrency from an individual or somewhere else, including in an authorized exchange.

The Limitation of Issuance

Unlike physical or paper money, wherein currency issuance is now under the control of the central bank that regulates the country's currency, cryptocurrency issuance is restricted to control inflation. Whenever it comes to issuing its money, the lions share of cryptocurrency on the market is confined to a specific quantity. Bitcoin, for instance, which represents for above 60% of the cryptocurrency market [24], has decided to cut down the number of bitcoins to 21 million [25]. So far, nearly 17 million bitcoins have been extracted. Bitcoin is not the only cryptocurrency, however. Over and beyond several other types of cryptocurrencies, there are various cryptocurrencies on the market with a restricted currency supply, like as Litecoin, that is limited to 84 million [26], and XRP, that is limited to around 100 billion [27].

Legal challenges facing cryptocurrency

Committing Criminal Activities Using Cryptocurrency

This is one of the most pressing legal concerns that cryptocurrencies encounters in its effort to bring widely spread recognition and acceptance. Cryptocurrencies' anonymity appears to make them an extremely appealing platform for cybercriminals to use in order to commit major crimes. As an outcome, governments across the world are paying very close attention to cryptocurrency regulation in monitoring and managing them [28]. The subject of the dark-web website "Silk Road" [29] is one of those which can be used to exemplify the illegal usage of cryptocurrency. The "Silk Road" dark-web online marketplace exchanges cryptocurrency, notably bitcoin, for something like a number of illegal goods and items. Using bitcoin as a form of payment, this dark-website platform enables criminals across the world to transact all sorts of illegal commodities, including arms and drugs, without exposing their identities. The web application was closed down and the proprietor was arrested by the US government in 2013 [30].

Silk Road is one instance of how cryptocurrencies can be used for carrying out illegal activities like as terrorism financing, money laundering, bribery, tax evasion, and several other illegal activities by using the distinctive features of cryptocurrencies such like decentralization as well as anonymity. One other case in this point is "United States of America v. Michael Mancil Brown" [31], wherein the latter was accused of extortion against previous presidential nominee Mitt Romney. The criminal proposed Romney $1 million United States of America dollar (US Dollar)' in bitcoin to an account specially created for this reason in exchange for not disclosing any sensitive information that could damage Romney campaign.

The Decentralization of Cryptocurrency

To be fully accepted as legal exchange throughout most nations, the currency must always be issued by a centralized authority recognized by the law. This system of printing notes and issuing new coins by a single entity will render counterfeiting the currency increasingly difficult [32]. The central authorities producing the centralized currency have lawful power under the legislation (Central Bank Act) to limit the issuance and distribution of such currencies in conformity with the approved monetary plan to protect and ensure economic stability [33]. The decentralized nature of cryptocurrency poses a legality difficulty as no central body oversees the issuance of cryptocurrencies or regulates transactions from the inside of the ecosystem. Because of this, monitoring and regulating efforts are complicated and time-consuming [34]. The decentralized nature of cryptocurrencies seems to have an effect on every aspect of the economy, and also issues like taxation, criminal activity, volatility, market manipulation, and many others.

Lack of Legal Framework

The US dollar, the Euro are now all recognized national medium of exchange currencies. People in the nation believe these currencies as they are all controlled. Cryptocurrencies, on the other contrary, are uncontrolled in the rest of the countries. As stated earlier [35], the lack of a proper legal framework which handles all legal difficulties can somehow lead to a wide variety of criminal activities. Moreover, a legal basis for such a new creation is needed to defend the rights of consumers and also companies. Besides that, the dearth of a regulatory framework will raise ambiguity about legality, taxation, succession, bankruptcy, Know Your Customer (KYC) policy, cyber-security, legal conflict, contract, intellectual property, and other issues. Due to the huge amount of attacks on exchanges that led to millions of dollars in losses, cybersecurity is also deemed one of the most challenging issues [36]. All of these problems occur as there is no comprehensive regulatory framework in place to specify rights and obligations, along with consequences and penalties. Another issue is lack of a unified relevant legislation or strategy to control cryptocurrencies and related activities. Every national and

intergovernmental organization has its own point of view on how cryptocurrencies should have been managed, categorized, and regulated. This circumstance provides a formal void that permits unlawful cross-border activities and helps for criminals to escape the law (like tax evasion) by switching to jurisdictions with less restrictive regulations [37].

The Instability in the Value of Virtual Currencies

The supply and demand policy, that shows public faith in a coin [38], is the most important component affecting the price of cryptocurrencies. This uncertainty is unfavorable for policymakers and regulators as the value of the standard might occasionally collapse as a consequence of a statement made by a powerful figure or by domestic or international authorities [39].

Fig 5: The volatility of the bitcoin price in a week

The cryptocurrency market sometimes can decline and lose upwards of a thousand of dollars in a week or less, as shown in [40, Figure 5]. In jurisdictions that adopt or regulate bitcoin, this issue represents a substantial concern [41]. And it has a massive effect on whether or not authorities adopt and constrain cryptocurrencies.

The Probability of Forming Legal Evidence in Court Cases

Cryptocurrency exchanges are autonomous, decentralized, and peer-to-peer, with blockchain technology as well as cryptographic hashing assuring system credibility. Depending on their specific nature, there remains an open question as to whether the sufferer can provide strong evidence which will be accepted or recognised by a court in the context of a law suit involving fraud, inheritance, bankruptcy, or other illicit activities [42]. As a result, the inadequacy of a legal framework mentioned earlier is an important and pressing issue which regulators must address in order to preserve and protect the rights of people.

Digital Inheritance

As previously stated, the paucity of a legal framework to monitor and control bitcoin transactions has a strong influence on estate planning. With the advent of technology and the rise of a new legal field termed as "digital inheritance" it is necessary to consider cryptocurrencies as a virtual currency that can be inherited because it is a monetary asset [43].

The complex nature of cryptocurrencies makes it more difficult to pass on such a valuable piece. This is a major issue which has resulted in many users losing their corpse cryptocurrency that was deposited in their crypto-wallet. Various instances can be given in this context, like the case of Matthew Moddy, a miner who died in a plane crash and left virtual currency in his crypto wallet, but his family was unable to retrieve this money as they were unable to get the secret key to the departed person's wallet. As a consequence, this pressing concern must be addressed properly, and rules or recommendations must be applied.

Cybersecurity

As shown in a research published in 2020 by "Chainalysis," a Blockchain analytical business, cryptocurrency criminals crafted $4.3 billion in digital cash in 2019, far beyond tripling the sum made in 2018. Necessity in providing secure and safe internet service, cybersecurity is still one of the most challenging issues and a fundamental topic which has a huge impact on world society [44]. It is hard to picture individuals, governments, or even other institutions in today's world being able to function efficiently and complete daily tasks without using a connected computer to a safe and reliable internet. As a result, the online world has become an important and necessary part of our lives as humans. The uncontrolled and anonymous characteristics of cryptocurrencies

plays a vital role to the growing amount of criminal activities relating to cryptocurrencies [45]. As a consequence, it is undeniable that cryptocurrencies are currently being used as both a weapon and a target by offenders to commit a large range of cybercrimes. Many surveillance have been attempted targeting persons or exchanges since the beginning of cryptocurrencies.

There are many more examples of cyberattacks, like as the cyber-hacking of the Japanese exchange "Mt Gox" that led to the company filing for bankruptcy. The company's online vaults were plundered of nearly 473 million dollars worth of bitcoin (roughly 850 Bitcoin) [46]. Another noteworthy example is the cyberattack of the Hong Kong-based exchange "Bitfinex" that resulted in the loss of 120 thousand cryptocurrency (about $72 million at the time), resulting the price of bitcoin to collapse by nearly 23% when information of the attack leaked [47].

These are just a few incidents of major human rights violations that occur frequently around the world. These cyber-attacks serve as a warning of the cryptocurrency system's vulnerability and the importance of ensuring a strong security. There are a wide range of other forms of cybercrime. Phishing is a type of cyberattack in which criminals apply specific strategies to trick users and corporate bodies into thinking that they are dealing with legal businesses. After successfully misleading its target, the criminal keeps going by asking for personal data or entities from the "Phisher" like log-in information, bank account details (together with information about credit or debit card information), address, or Identity card number, among some other things [48]. The wallet address is the details sought by the Phisher in the cryptocurrency realm. The Tokyo-based company "Coincheck" that is one of Asia's largest cryptocurrency exchange, put out a statement on May 31, 2020, stating that various phishers had started assaults towards the company's customers, as an evidence of phishing. Customers' private information, such like names, addresses, dates of birth, and telephone number, was made public out, as shown in the firm.

However, Digital assets of the clients, have not been plundered or harmed.

Malware is another instrument which criminals might use to conduct their unlawful actions. Malware is identified as malicious programs (including such viruses, spyware and ransomware) that are also designed to harm a computer or network or system, or to get unauthorized access to a network or hardware in case of theft [49]. On July 11th, 2020, Cashaa, a peer-to-peer transaction network, disclosed that 336 bitcoins had already been lost as a result of a malware attack. The virus was inserted by the attackers onto one of the currency's systems, enabling the hackers access to it, as according to Cashaa. Another striking example of a computer hacker is the Ponzi scheme, which is a deceitful investing system that betrays people into investing their money by guaranteeing them a higher profit with no or little risk. The money received from new investors is being used to pay returns for older investors in a Ponzi scheme. As a result, no money is being invested anywhere [50].

Results

After introducing cryptocurrency, blockchain, and other elements, as well as describing how cryptocurrency functions, the study went on to discover the legal issues which cryptocurrencies confront, and the essentiality for a sustainable framework to be executed by different countries around the world. One of the problems surrounding government departments and law enforcement agencies is to use cryptocurrency for malicious purposes. Due to their unique characteristics, like anonymity and decentralization, cryptocurrency play a vital role in preventing terrorists' attempts to attack. Cybercrime is a major crime that represents a great risk to all cryptocurrency investors as well as exchanges. The inadequacy of a regulatory framework that describes cryptocurrency and decides which uses are legal or which are illegal is still the big weakness in most states' legislation. This has effects for all other legal concerns, like digital inheritance as well as evidence availability. However, the instability of these resources, as well as the penal system in affecting their valuation and stability, is one of the main challenges linked with the legal question that has a substantial impact on legislators.

Recommendations

The study makes a number of suggestions for improving approaches and overcoming legal obstacles. These suggestions are summarized in the following points:

- To acquire ultimate benefits and minimize any related harmful and dangerous consequences, lawmakers in each nation should enact specific regulations and even sometimes amend current regulations and laws. The legal community also should draw attention to the matter of virtual inheritance and heirs' entitlement to these crypto assets after the death of the individual in issue.
- Governments should also develop a dedicated authority to examine all aspects of digital currencies, particularly centralised and decentralized markets, Initial Coin Offerings (ICOs), and computer security concerns, and also undertake extensive research in the subject.
- Employ competent judges who are able to comprehend all of the issues concerning cryptocurrencies and related technologies, and ensuring that court procedures are quicker and safer.
- The awareness level regarding the risks involved with dealing in or to use these assets, such as fluctuation and cyber-attack insecurity, should be raised.
- States can also begin to develop their unique national cryptocurrencies which are carefully regulated and monitored in order to preserve and protect these autonomous currencies even while ensuring the eventual benefits to their respective country.
- To provide more attention to the issue or provide better alternatives, further study on the financial and legal aspects of cryptocurrency should have been conducted.

- Hopefully, cryptocurrency will go on for a long time. It is an innovation that was launched to revolutionize our entire globe, not always financially, but also with all other aspects.

Conclusion

Cryptocurrencies are one of the most significant inventions of the last ten years. They were formed as a substitute for or a supplement to the modern financial system, as per their developers. Despite its numerous benefits and advantages, numerous people across the world still regard cryptocurrencies as just a contemporary idea, particularly regarding their security.

Advantages, risks, and processes all are factors to take into account. Cryptocurrencies are considered like one virtual currencies which function on a decentralised network and utilise cryptography to to provide visibility and transparency to the platform and adjust the production of money, mentioned to as "blockchain" Blockchain has rapidly become a popular issue and a revolutionary technology which has attracted the attention of governments, financial institutions, and organizations all over the world.

The cryptocurrency techniques must also be discussed to the public at large in order to gain a clearer understanding of such a new technology, its transactional validation, and the mining procedure in order for them to be able to add transactions to the chain as well as receive benefits in the future. Cryptocurrencies, as just a relatively new invention, provide a number of benefits that may make this world safer and easier. Cryptocurrencies, like any other modern technology, face a slew of legal difficulties as well as obstacles which must be achieved in order for them to be used more safely and effectively.

References

1. Al Mashhour O, Aziz ASA, Noor ANM. "An Investigation for A Legal Framework Governing Cryptocurrencies Under The Syrian Legislation: An Analytical Study", Journal of Critical Reviews, vol. 7, no. 12, pp. 2761-2767, 2020. Available: http://dx.doi.org/10.31838/jcr.07.13.418.
2. Crowley B. "The Legal and Regulatory Issues Surrounding Cryptocurrency", Project Submitted in partial fulfillment of the requirements for Departmental Honors in the Department of Finance, Texas Christian University, 2018.
3. Narayanan A, Bonneau J, Felten E, Miller A, Goldfeder S. *Bitcoin and cryptocurrency technologies*, 1st ed. Princeton: Princeton University Press, 2016.
4. Patton M. "Qualitative Research", Encyclopedia of Statistics in Behavioral Science, 2005. Available: 10.1002/0470013192.bsa514 [Accessed 15-Mar-2022].
5. Crypto Definitions Staff. "What Are Cryptocurrencies?", *CryptoDefinitions*, 2020. [Online]. Available: https://cryptodefinitions.com/What-Are-Cryptocurrencies-In-Plain-English/. [Accessed: 20- Feb- 2022].
6. "All Cryptocurrencies", *CoinMarketCap*. [Online]. Available: https://coinmarketcap.com/all/views/all/. [Accessed: 23- Apr- 2022].
7. Jokić S, Cvetković AS, Adamović N, Ristić, Spalević P. "Comparative analysis of cryptocurrency wallets vs traditional wallets", *Ekonomika*,2019:65(3):65-75. Available: 10.5937/ekonomika1903065j [Accessed: 17-Feb-2022].
8. Brosens T. "Why Bitcoin is destined to become a niche asset: A Cryptocurrency Reality Check", Internationale Nederlanden (ING), Amsterdam, 2017.
9. A. Pîrjan, D. Petroşanu, M. Huth and M. Negoiță, "Research Issues Regarding The Bitcoin And Alternative Coins Digital Currencies", *Journal of Information Systems & Operations Management*,2015:9(1):3. Available: http://www.rebe.rau.ro/RePEc/rau/jisomg/SU15/JISOM-SU15-A19.pdf. [Accessed: 20- Mar-2022].
10. Houben R, Snyers A. "Cryptocurrencies and blockchain: Legal context and implications for financial crime, money laundering and tax evasion", European Parliament, Brussels, 2018.
11. The Financial Action Task Force, "Virtual Currencies Key Definitions and Potential AML/CFT Risks", FATF, Paris, 2014.
12. Houben R, Snyers A. "Cryptocurrencies and blockchain: Legal context and implications for financial crime, money laundering and tax evasion", European Parliament, Brussels, 2018.
13. Organisation for Economic Co-operation and Development, "OECD Blockchain Primer", OECD, Paris, 2018.
14. Pricewaterhouse Coopers Advisory, "Blockchain: a catalyst for new approaches in insurance", PWC, 2017.
15. Seth S. "Explaining the Crypto in Cryptocurrency", *Investopedia*. [Online]. Available: https://www.investopedia.com/tech/explaining-crypto-cryptocurrency/. [Accessed: 12- Feb- 2022].
16. Sterry D. *Introduction to Bitcoin Mining A Guide For Gamers, Geeks, and Everyone Else*, 1st ed. Coin DL, 2012.
17. O'Neill C. "Forks, Merkle Trees, and Bitcoin (Oh My)", Medium, 2018. [Online]. Available: https://medium.com/coinmonks/forks-merkle-trees-and-bitcoin-oh-my-4696079cafaf. [Accessed: 21- Mar-2022].
18. Brownworth A. "Blockchain Demo", Andersbrownworth (SHA256 Hash). [Online]. Available: https://andersbrownworth.com/blockchain/hash. [Accessed: 21- Mar- 2022].
19. Brikman Y. "Bitcoin by analogy", Yevgeniy Brikman, 2014. [Online]. Available: https://www.ybrikman.com/writing/2014/04/24/bitcoin-by-analogy/. [Accessed: 25- Mar- 2022].

20. "Unconfirmed Transactions", *Blockchain*. [Online]. Available: https://www.blockchain.com/btc/unconfirmed- transactions. [Accessed: 16- Feb- 2022].
21. Kenton W. "Bitcoin Mining Definition", *Investopedia*, 2020. [Online]. Available: https://www.investopedia.com/ terms/b/bitcoin-mining.asp. [Accessed: 22- Feb- 2022].
22. Frankenfield J. "Proof of Work", *Investopedia*. [Online]. Available: https://www.investopedia.com/terms/ p/proof-work.asp. [Accessed: 20- Feb- 2022].
23. Zhu S, Li W, Li H, Hu C, Cai Z. "A survey: Reward distribution mechanisms and withholding attacks in Bitcoin pool mining", *Mathematical Foundations of Computing*,2018:1(4):393-414. Available: 10.3934/mfc.2018020 [Accessed 20 February 2022].
24. "Global Cryptocurrency Charts", *CoinMarketCap*. [Online]. Available: https://coinmarketcap.com/. [Accessed: 15- Feb- 2022].
25. Meynkhard A. "Fair market value of bitcoin: halving effect", *Investment Management and Financial Innovations*,2014:16(4):72-85. Available: 10.21511/imfi.16(4).2019.07 [Accessed: 09- Feb-2022].
26. Mcfarlane G. "What Is Litecoin, and How Does It Work?", *Investopedia*, 2019. [Online]. Available: https://www.investopedia.com/articles/investing/040515/what-litecoin-and-how-does-it-work.asp. [Accessed: 29- Apr- 2022].
27. Levy A. "Ripple is sitting on close to $80 billion and could cash out hundreds of millions per month — but it isn't", *CNBC*. [Online]. Available: https://www.cnbc.com/2018/01/16/why-ripple-is-not-cashing-out-its-xrp- holdings.html. [Accessed: 20- Apr- 2022].
28. Brown S. "Cryptocurrency and criminality", *The Police Journal: Theory, Practice and Principles*,2014:89(4):327-339. Available: 10.1177/0032258x16658927 [Accessed: 17-Feb-2022].
29. Christin N. "Traveling the Silk Road: A measurement analysis of a large anonymous online marketplace", in *Proceedings of the 22nd international conference on World Wide Web*, 2013, 213-224.
30. Vigna P, Casey M. *The Age Of Cryptocurrency*, 1st ed. Macmillan, 2016.
31. The case of United States of America V. Michael Mancil Brown (Court of Appeals, Sixth Circuit. 857 F.3d 334 2017).https://www.leagle.com/decision/infco20170515088.
32. Chappelow J. "Legal Tender Definition", *Investopedia*. [Online]. Available: https://www.investopedia.com/terms/l/legal-tender.asp. [Accessed: 11- Mar- 2022].
33. International Monetary Fund, "Monetary Policy and Central Banking", IMF, Washington, D.C., 2019.
34. du Plessis P. "The Nature of Decentralized Virtual Currencies: Benefits, Risks and Regulations", Master of International Law and Economics, World Trade Institute., 2014.
35. Frebowitz. "Cryptocurrency and State Sovereignty", Master's thesis, Naval Postgraduate School, 2018.
36. Massad T. "It's Time to Strengthen the Regulation of Crypto-Assets", Brookings Institution, Washington, D.C., 2019.
37. Frebowitz. "Cryptocurrency And State Sovereignty", Master's thesis, Naval Postgraduate School, 2018.
38. Bloomenthal A. "What Determines the Price of 1 Bitcoin?", *Investopedia*. [Online]. Available: https://www.investopedia.com/tech/what-determines-value-1-bitcoin/. [Accessed: 23- Feb- 2022].
39. A. Marshall, "How China Influences Bitcoin Price, Explained", *Cointelegraph*, 2017. [Online]. Available: https://cointelegraph.com/explained/how-china-influences-bitcoin-price-explained. [Accessed: 07- Feb-2022].
40. Coinmarketcap. "Bitcoin price today, BTC live marketcap, chart, and info", CoinMarketCap. [Online]. Available: https://coinmarketcap.com/currencies/bitcoin/. [Accessed: 21- Mar- 2022].
41. Guadamuz A, Marsden C. "Blockchains and Bitcoin: Regulatory responses to cryptocurrencies", *First Monday*, 2015, 20(12). Available: 10.5210/fm.v20i12.6198 [Accessed: 17- Feb-2022].
42. Sapovadia V. "Legal Issues in Cryptocurrency", *Handbook of Digital Currency*, 2015, 253-266. Available: 10.1016/b978-0-12-802117-0.00013-8 [Accessed: 12-Feb- 2022].
43. Al Mashhour O, Abd Aziz A. "The Era of Cryptocurrencies: A Study About the Advantages and Disadvantages", in *The Proceeding of The First Sois Conference on Arts and Humanities (Sicah) 2019 reshaping sustainable development agenda through arts & humanities*, Kedah, 2019, 10-20.
44. O'Connell M, Arimatsu L, Wilmshurst E. "Cyber Security and International Law", chathamhouse, London, 2021.
45. Bray J. "Anonymity, Cybercrime, and the Connection to Cryptocurrency", Master Thesis, Eastern Kentucky University, 2016.
46. Decker C, Wattenhofer R. "Bitcoin Transaction Malleability and MtGox", *Computer Security - ESORICS 2014*, pp. 313-326, 2014. Available: 10.1007/978-3-319-11212-1_18 [Accessed: 15-Feb-2022].
47. Hu J, Luo Q, Zhang J. "The Fluctuations of Bitcoin Price during the Hacks", *International Journal of Applied Research in Management and Economics*,2020:3(1):10-20. Available: 10.33422/ijarme.v3i1.278 [Accessed: 12-Feb-2022].
48. Maras M. *Computer Forensics: Cybercriminals, Laws, and Evidence*, 2nd ed. Massachusetts: Jones & Bartlett Learning, 2014.
49. Thampi S, Bhargava B, Atrey P. "Managing Trust in Cyberspace", in *A Comparison of Three Sophisticated Cyber Weapons*, 1st ed., M. Vinay and M. Balakrishnan, Ed. London: Chapman and Hall, 2021, 387.
50. Maras M. *Computer Forensics: Cybercriminals, Laws, and Evidence*, 2nd ed. Massachusetts: Jones & Bartlett Learning, 2014.