The Concept of Cryptocurrency in Axiology of Science Perspective

Rizal Mustansyir and Citra Istiqomah

The Concept of Cryptocurrency in Axiology of Science Perspective

Rizal Mustansyir[1,*] and Citra Istiqomah[2]

1 Faculty of Philosophy, Universitas Gadjah Mada, Yogyakarta, Indonesia
2 Department of International Relations, Faculty of Social and Political Sciences, Al Azhar University, Indonesia

*e-mail: mustansyir@ugm.ac.id

Abstract

Massive transformation and multifaceted nature of innovation due to increasing interconnectivity in globalisation era–particularly through the discourse of the Internet of Things (IoT)– have made technology and its instruments nearly inevitable in human life, not least in the economic sector. Cryptocurrency as one of the products of this activity is getting a great deal of public attention. Over time, this currency is gradually favoured by many people around the world, especially with the demands for ease of business and transactions in the era of digitalisation. The shift allows individuals with access and associated resources to store personal assets that cannot be censored/detected by central and banking authorities, carry out anonymous financial transactions, make high-speed transfers, invest in start-ups, mine new cryptocurrency, and even buy land or property in the virtual world/metaverse. All these advantages and conveniences encourage individuals, especially businesspersons and investors to switch to cryptocurrencies. However, its volatility also incites hesitation to adopt it as a medium of exchange/trading transactions. Due to the functionality, legality, and disputable implications of its use, this issue evokes our interest to study it as a subject matter, especially through the lens of axiology. This study employs a qualitative method to generate descriptive results. Cryptocurrency serves as a form of digital asset that functions as a virtual medium of exchange run in a blockchain system and is secured using an automated cipher called cryptography. From an axiological point of view, the writer considers at least 5 (five) values constituting priority scales in crypto transactions: trust, agreement, utility, pride, and speculation. Finally, the writer concludes that cryptocurrency utilisation cannot be separated from the axiological perspective of science, considering the gap between personal and social values is pertinent.

Keywords

1 Introduction

Numerous experts consider the global community has now been embarking on the era of Society 5.0, a concept that lies heavily upon the progress of mankind (human-centred society) based on the use of technology. In the 5th Science and Technology Basic Plan initiated by the Japanese government in 2016, referring to its definition, Society 5.0 is "*a human-centred society that balances economic advancement with the resolution of social problems by a system that highly integrates cyberspace and physical space*." This concept aspires to an intensification of human interaction with technology, such as robots and artificial intelligence, in everyday life to enrich the quality of life in a sustainable manner. The era of Society 5.0 involves attainment of a high level of convergence between virtual and physical space (real space), moving forward from its preceding Information Society 4.0 era where people accessed databases through cloud computing services in cyberspace via the Internet: to search, retrieve and analyse information or data. Formerly, the common practice was to gather information over a network which was then analysed by humans. However, in the era of Society 5.0, an ample amount of information from sensors in physical space is accumulated in cyberspace, where this big data is then analysed using artificial intelligence (AI), yielding analyses that are fed back to humans in physical space in various forms. Principally, humans, things, and systems are all connected in cyberspace and the optimal results accrued by AI "beyond human capabilities"

are passed on to physical space. This process brings new values to industry and society in a way implausible before (Cabinet Office, the Government of Japan, n.d.).

Today, modern humans conduct a bunch of activities in the second reality that replaces the first reality – the world where we live and carry out activities as we can feel using our senses in everyday life. The world of second reality began to manifest in most of the life aspects of contemporary people, even some human needs and desires have shifted to the virtual world. Absolute iconism as one of the natures of hyperreality is able to depict a high degree of similarity between the original object and its replica as a perfect representation of the original image. The principle of discontinuity in hypersemiotics gives birth to a duration full of interruptions, disconnections, and intersections that create a space for difference and free play of signs and codes. Old conventions disappear to give rise to new conventions which adhere to the principle of simulating the creation of a second reality which, according to Baudrillard, owes reference to itself (*simulacrum of simulacrum*). Jean Baudrillard in his work *Consumer Society* stated that the virtual world is a virtual reality exhibiting the intertwining of global communication, holograms, and art. Pseudo reality is a social system created to form a code and avoid pressure from the outside (Lechte, 2001, p. 355-356).

Indubitably, the terminology of virtual world/metaverse, virtual reality, and augmented reality predisposes discourses in contemporary society, one of which is regarding the concept and use of cryptocurrency. Cryptocurrency (or crypto in short) is a form of currency that applies in the digital or virtual world that resorts to cryptography to secure transactions made by its users. This is often referred to as 'the art of writing or solving codes'. Remarkably, it does not have a central regulatory authority like any other currencies in the real world. Cryptocurrencies employ a decentralised system that records transactions and issues new units or changes. The existence of cryptocurrencies is one of the proofs of a shift in the typology of society and human lifestyles which are increasingly inseparable from technology utilisation. Therefore, the author puts particular interest in dissecting this issue further and conducting a study through an axiological (philosophy of value) perspective.

2 Research Questions

This research is focused on addressing the following research questions:
1. What is cryptocurrency?
2. How does its utilisation process work virtually?
3. How is the concept of cryptocurrency viewed from the perspective of the axiology of science?

3 Methods

This study uses qualitative methods to explore various information and explore its meaning in order to produce descriptive data. The research material is based on several sources of literature from scientific research and the Axiology of Science literature. Hugh Lacey's 1999 book titled *Is a Science Value Free?* becomes the main source of reference, accompanied by supporting sources in the form of printed and electronic books, scientific and popular articles (news), journals, and videos of scientific lectures in various media that specifically discuss cryptocurrencies.

4 Theoretical Framework

The Axiology of Science
Axiology is a branch of philosophy emerged in the second half of the 19th century with a core focus on studying values. The value itself according to Risieri Frondizi is said to be a quality that is not real. Value is inherent because it shall be vested in an object or event (Frondizi, 2001, p. 1-8). As a form of nature or quality, value generates interest so that it also becomes the object of interest of an individual or a group of people. Hence, values can represent shared objects or ideals that society agrees to bring about prosperity, so it is not surprising that people have very high hopes for values, as Hugh Lacey proposed a type of personal value that can be defined as follows: ***First***, value is something that is fundamental and is

consistently pursued by an individual or a group of people throughout their lives; **Second**, value is a highly valuable quality, just like goodness, meaning, or a fulfiling nature of one's life; **Third**, value as a quality that forms the identity of a person or group of people functions for evaluation, interpretation, and self-formation; **Fourth**, value can also be a fundamental criterion for someone to opt for the best possible thing among the most likely actions; **Fifth**, value is a fundamental standard for a person to behave towards himself or others; **Sixth**, as an object, value embodies the right relationship, thus making one's life valuable, as well as becoming a personal identity. In addition to these six personal values, Lacey added one type of social value, namely something that is manifested in the programs, laws, and policies of a group of people, and is expressed in practice in defining and reinforcing conditions (Lacey, 1999: 23).

Furthermore, Lacey appended cognitive values as the development of human awareness in dealing with life problems which can be summarized as follows: **First;** they serve as characteristics; criteria about the goodness that can rationally be accepted based on trust. **Second;** goodness can truly be recognised theoretically, meaning that wherever good is done, in principle, it will be recognised by many people. **Third;** belief concerning human nature and achievable things is estimated to include value intricacies. **Fourth;** the complex value involves shared desires and the application of actions. **Fifth;** an action causes a person to desire to obtain a definite result and believe that the action will lead to the realisation of that result. **Sixth;** those who succeed in adopting and constructing these values in their life will achieve the ideal truth (Lacey, 1999: 50-57).

Additionally, in *Is Science Value Free?* Lacey stated that values possess at least these foundational facets: autonomy/independence (which consists of neutrality and impartiality) and strategies of materialists (Lacey, 1999 p. 74-87; p. 104-107). A value itself is an overflow of feelings that is presumably given empirical status by idealists-constructivists. However, those who oppose it argued that emotional outbursts are subjective, and so, how is it possible to give a general-empirical status to that? For them, empirical status can only be strengthened by rational/general laws.

In discussing its use, cryptocurrency can be seen as an object, event, as well as a construct of thought enacted by a group of people, and its transactions are based on underlying trust between individuals which are converged as general law. This was deliberately created to overcome cultural values that apply in general–for example, transactions that are usually authorised and/or guaranteed by banks– and justify "common law" for the formation of new social rules. According to Caffentzis, as argued by John Locke, money as a manifestation of personal ownership (possessive individualism) involves an abstract conception of property and the will to create it which is termed "*cogito ergo habo*" ("I think, therefore I have"). Caffentzis further added that this also allows possessive universalism, namely the generalisation of forms of commodities due to their use by the community, not only by individuals (Caffentzis, 2021, p. 14-15). This also applies to crypto as a virtual currency. The implementation of value as a quality and identity will further be elaborated in the sub-topic of the axiological views of cryptocurrencies in this writing.

5 Analysis

5.1 The History and Development of Cryptocurrencies

The first cryptocurrency allegedly appeared in the early 1980s, especially in 1983 when David Lee Chaum, a cryptographer computer scientist from the United States published his breakthrough work entitled *Blind Signatures for Untraceable Payments* upon the completion of his dissertation at the University of California, Berkeley in 1982. In this paper, he proposed the creation of a system to encrypt payments/financial transactions mathematically. Chaum then proposed a token currency concept that could be transferred between individuals securely and privately, then developed a "blinding formula" and a series of cryptographic protocols to encrypt transaction information. This became the forerunner to the development of the digital currency that is known today. He used this abstraction and formula to introduce a form of electronic payment (electronic cash) called eCash through the establishment of the DigiCash company initiated in 1990 (Reiff, 2022). However, the company went bankrupt in 1998, a decade before the 2008 global financial crisis turned into a catalyst for the emergence and utilisation of virtual instruments and assets, including cryptocurrencies. Some of the bankruptcy factors were presumably caused by poor internal management, refusal to establish wider partnerships with major banks such as ING (although in 1996 DigiCash had made agreements with several banking institutions such as Deutsche Bank, Credit Suisse, Bank Advance Bank Australia, Norske Bank, and Austrian Bank), as well as distrust towards big technology players such as Microsoft and Netscape (Frankenfield, 2021). Apart from eCash, several

electronic financial system products that were designed to be digitally integrated at that time included B-money, Bit Gold, and Hashcash which were considered as pioneers of various types of cryptocurrencies existing today.

One of the cryptocurrencies touted as a pioneer is Bitcoin. It is claimed that early formulation of this currency was initiated by a man named Satoshi Nakamoto who released a white paper at the end of 2008, and then marked its marketing in 2009. However, it was later discovered that the name was just a pseudonym and the background was confusing; hence, the initiator of this currency remains unknown. Many people think that this idea is closely related to the goal of restructuring a new global financial and monetary system by a handful of political elites, often referred to as the globalists.

Cryptocurrency itself is broadly defined as virtual or digital money in the form of tokens or "coins". Some cryptocurrencies are connected to the physical world by credit cards or other financial projects and instruments, but most remain completely intangible. The term "crypto" refers to the complex cryptography that makes it possible to create and process digital currencies and their transactions in a decentralised system. Cryptocurrencies have almost always been designed to be free from government manipulation and control—even though due to their skyrocketing popularity, basic aspects of this industry have come under fire (especially from central authorities). Thus, a shared commitment to decentralisation is a key feature. What is equally principal is that cryptocurrencies are generally developed as code by a group of people who create mechanisms for issuing new cryptocurrencies (often, though not always, through a process called 'mining' and other controls). Cryptocurrencies modelled on Bitcoin (using Bitcoin as a reference) are collectively called Altcoins (short for alternative coin) and often try to present themselves as modified or enhanced versions of Bitcoin. Although some Altcoins may have some new features as a result of development that Bitcoin does not have, the level of security of the Bitcoin network is unmatched (Hayes, 2022).

Typologically, Altcoins can be distinguished into cryptocurrencies and tokens which are often understood by ordinary traders and investors as the same product because all categories of tokens are generally traded on crypto exchanges in the same way. Cryptocurrencies (such as Ethereum, Tether, Monero, Tron, XRP, Cardano, Solana, and others) are utilised for payment and transmission of financial value through a decentralised network of users. Most of the Altcoins (with the exception of Bitcoin and sometimes also Ethereum which are considered 'big players') are classified in this category and are sometimes referred to as 'value tokens'. Another type is 'blockchain-based tokens' which are intended to serve functions other than payment and transmission, for example the release of tokens as a part of an initial coin offering (ICO) that represents a stake in a particular blockchain or financial decentralisation project. If tokens are associated with company or project values, they can be referred to as 'security tokens'. Other tokens have different uses or functions, for example the Storj token, which allows individuals to share files using a decentralised Domain Name System (DNS) service for Internet addresses, thus known as 'utility tokens' (Hayes, 2022).

Based on statistical data, until February this year there were more than 10,000 types of cryptocurrency circulating on the exchange market (Statista, 2022). According to Cointelegraph records, by the end of this year there are approximately 21,000 different types of crypto coins (Jones, 2022). The majority of cryptocurrencies today are derivatives (in various forms) of Bitcoin that apply open-source code and a censorship-resistant architecture. This means that anyone can copy and modify the code and create their own new coins (through some set of procedures) (Hayes, 2022)

In Indonesia, cryptocurrency is recognised merely as a trading commodity. This is legally regulated through the Ministry of Trade Regulation No. 99 Year 2018. All currency trading activities are strictly regulated and supervised by the Commodity Futures Trading Regulatory Agency (or BAPPEBTI in Indonesian). Due to its debatable aspects of functionality, legality/regulation, and usage implications, it is compelling to make cryptocurrency as an object of study and analyse it in depth, in which under this study will mainly be focused on a review in terms of value (axiology).

5.2 Cryptocurrency Definition and Methods of Operations

Cryptocurrency is a form of digital asset that functions as a virtual medium of exchange and is secured using a computerised system as well as reading of written secret codes called cryptography based on blockchain technology. This self-computerised system is claimed to be impenetrable because it works in singularity/is anti-duplication in nature, unlike other forms of exchange in physical form. Blockchain technology itself is a series of financial records (blocks of records)–or what is called a 'ledger'– secured and linked to cryptography. These records are said to be resistant to data modification because each record has a digital

time stamp, transaction data, and a hash pointer associated with the previous "block". Blockchain technology is managed by a peer-to-peer (P2P) network, a two-way communication model between computer or Internet users without going through a server. This network does not have centralised control on shared resources so that they can move freely. Each host can be a server as well as a client at the same time, making it easier for users to download or upload various types of data around the world (Stafford Global, 2021). Simply put, cryptocurrencies are designed as instruments for exchanging digital financial information via blockchain, meaning that this currency can be used like traditional currency we know and use every day, but all transactions are carried out online.

Unlike other currencies or means of exchange, cryptocurrencies are not produced by a central authority, so this makes them immune to government regulation/management and manipulation. Jan Lansky, a scientist at the Department of Computer Science and Mathematics, The University of Finance and Administration, Czech Republic requires 6 preconditions needed to define cryptocurrencies:

1. The absence of a central authority that regulates currency movements. The management system is based on consensus distribution (decentralised in nature).
2. There is a system that manages unit overview and ownership.
3. The computerised digital system independently determines whether a new unit can be created or not. If not, the system can determine the origin of the unit and methods to regulate unit ownership.
4. Unit ownership can exclusively be proven cryptographically.
5. Unit ownership can be changed/transacted, but transaction statements can only be issued by legitimate unit owners.
6. The system will only perform one instruction for a change of ownership if there is more than one transactional order entered (Stafford Global, 2021).

The principle of trust turns as a core mechanism that users/owners of these assets rely on and provides basis for their ownership and use. Due to the absence of a central authority as a guarantor, if unwanted things happen to the ownership of these assets, then this is entirely the responsibility of the owner who is willing and consciously saves his assets in that form. As such, the basis for buying, owning and using cryptocurrencies is purely on the principle of trust in the automation that carries out their circulation. The foundation of established trust is a transactional agreement/convention between owners, both the owner of the fund and the owner/designer of the system.

5.3 The Role of Big Data in Political-Economic Activities

Kalev Leetaru, a scientist at George Washington University, USA, in his 2012 seminar, once explained the influence of big data on politics and decision-making processes that occur in the contemporary global era. The development of human life civilisation occurred so quickly, from traditional humans who originally merely utilised conventional tools into modern humans as we are today. Modern human life cannot be separated from the rapidly growing role of technology and the rapid flow of information that helps humans document various changes and developments in their lives.

Along with the increasingly widespread increase in accessibility to electricity, there has been a surge in the use of electronic media in human life. The human brain naturally synthesizes information, and now the world of information has changed. Kalev said that every day more than 100 billion pieces of information or data are disseminated via social media. This massive number is proof that the public has now joined the network of global electronic media users or what Kalev calls a fast ground-base social centre network, referring to a fiber-optic-based social centre network as a means of fast data transmission. News searches are now available through websites or other electronic media. Likewise with data that can be accessed through Wikipedia which according to Kalev is a big pile of text often used as a source of reference for data by many people, as well as Google Maps. In addition, the widespread use of social media such as Facebook (having around 1 billion members worldwide) and Twitter in various parts of the world which constitute 1/3 of the global online population makes people more connected.

In this era of fast and massive information technology, traditional barriers such as distance are no longer relevant. Likewise with language barriers as electronic media provides multilingual features that enable people around the world with different cultural and linguistic backgrounds to still be able to access information according to their understanding of the language. This is in line with the concept of globalisation explained by David Harvey regarding time-space compression or annihilation of space by time which pinpoints that space and time are now merge at one point because real-time interconnectivity eliminates the sense of differences in space. spaces). Kalev gave an example regarding the development of

information and data during the 2012 general election in the United States (US), which can be followed online and in real-time by the public, was mapped via Twitter heatmap. Rhenald Kasali (2018, p. 119-120) stated that the conceptual shift of time occurs based on the time series concept used by Robert Malthus to predict the scarcity of food sources in the future through his popular saying that population growth increases geometrically, while food growth increases arithmetically. The concept of time based on time series utilises statistical analysis. Along with advances in the field of digital technology, the concept of time has changed from time series to real time, because it is related to the processing of big data that occurs in social media networks. The ability to process data quickly and on target (velocity) makes data obtainable in real time and used in real time as well.

What is then the relationship between the development of information-technology and policy-making as well as global politics? First, various incidents such as the protests in Thailand, the conflict in Syria, or the riots in Afghanistan that occurred in other parts of the world through millions of sources of data and information can be obtained through social media, TV as well as printed and electronic news. Events like protests and demonstrations are now more dominantly highlighted by the media. In this case, big data can influence the diplomatic process because it provides information for critical decision considerations for policy makers ('providing with tools to make more decisions using cold, hard facts'). According to Kalev, events such as the Arab Spring can even be predicted in advance through big data analysis.

Second, in the context of global diplomacy, information and data certainly have a substantial meaning. Foreign policy and diplomacy are made by the ruling elites, and in this case the media can play a vital role, in particular, "controlled" by the big powers that control big data. The big powers referred here are said to be the central parties controlling big data, which are the US and Europe. Both can freely frame cases or events happening in the world. For example, the US mission to Korea in 1973-1976 visualised global diplomacy of data exchange between the two. Other cases such as Edward Snowden, Julian Assange, the US presidential election of Barack Obama and Donald Trump, as well as the recent protests in Thailand and Hongkong were also heavily influenced by the role of the media in shaping people's perspectives and disseminating information from these cases. Even the case of Iran's nuclear non-proliferation efforts so far has also been shaped by the US perspective propagated through the media. In this context, it is not only the government that has a major role in shaping and influencing public perceptions of a case. Other groups that are no less important and can influence the government are academics, business people, and other related epistemic communities.

In general, big data helps understand the current social reality. However, this shall be understood as patterns instead of the truth itself. The more data, the more it can help the political considerations of stakeholders in making policies as patterns will be visible from the database of events that have occurred. Analysis of big data according to Kalev can produce real and concrete social change. Yet, when viewed from a different angle, the utilisation of user data contains anomalies that can be considered as a threat to the users themselves. This could trigger what Thatcher and Dalton (2022) call 'data colonialism' in the cybersecurity field.

Data indeed plays an pivotal role in the daily life of modern humans and makes a more organised and easier life. Chris Anderson (2008) in "The End of Theory: The Data Deluge Makes the Scientific Method Obsolete" calls this phenomenon a "data revolution". Data revolution provides a new way of looking at data. Those that originally served as a support for scientific research is now evolving as if they are autonomous moving subjects and in turn, doing research for us, generating new knowledge on their own.

Several large companies such as Amazon, Apple, Facebook, and Microsoft became giants that control the data. They gigantic power owes to a significant shift in the value held by the data. A century ago, this high value was held by oil as the main commodity. But nowadays, data is referred to as the "new oil", therefore giant companies are trying to regulate the flow of data to generate profits for them. Commodified data can be meaningful and valuable only when extraction steps are carried out after collecting, reading, storing and analysing them in large quantities. Compared to oil that can be sold directly to earn a tangible profit, data can have invaluable value to those who can make use of it. Someone may be able to get the data, but not everyone can take advantage of it.

Data on a small scale and individually can be of no value. However, for business people and stakeholders, this can contribute to an integrated system. An example is Instagram, where uploaded photos stored as data may be worthless to someone, but for the Instagram algorithm, this data can be integrated with previously uploaded data, user friendship networks, locations, and other various forms of data. This eliminates the privacy values that humans used to hold before data and the internet entered people's daily lives. David Harvey (2004) called the phenomenon of breach of private data as "data colonialism". Colonialism that is bound by deprivation of rights, identity, ownership of people's lives, together with the

core definition of data, results in breaches of privacy that occur in a structured and integrated manner to generate profits from data utilisation for giant companies.

In the view of data capitalism, real experience can be commodified and commercialised or disseminated to detach it from real experience, thereby setting boundaries for what is real which is determined by market conditions. How the market mechanism provides an opportunity to feel an experience is likened to the way and process of forming one's experience to observe the surrounding environment. The experience is then integrated with a variety of interrelated data so that it can provide what the person needs and limit the features in real life.

The use of technology as a biopolitical tool and as a means of controlling society has been carried out by many governments in the world, one of which is China, which uses a social credit system. Accumulated data from people's actions, such as taxes, debts, crimes, or other history are used to create a system administered to assess whether a person is good or bad, which is determined in the form of points or credits. Both good and bad deeds can affect the credit score one has and benefits from the government. Furthermore, through the COVID-19 case, the Chinese government uses surveillance cameras to monitor its people for indications of COVID-19. More than just surveillance, this can indicate the birth of 'a new normal' when surveillance cameras are normalised for more general interests. In the legal field in America, for example, law enforcers may require an official warrant to request someone's data, but with the use of data, these regulations can be transferred using publicly available data without the need to issue a warrant.

Either morally, normatively, or ethically, the use of data can be said to be included in the violation of human privacy rights. On the other hand, the use of data can also facilitate human life. Basically, it must be an object for human needs, not a subject that dictates human life so that the data can be maximised in its use for the purpose of human life and not to "misguide" humans in the direction "given" by the data algorithm. In essential fields such as health and biomedicine, such as in the case of a pandemic, visible distribution data can be employed as a reference in policy formulation, or in individual social media, provide early signs or detection whether or not the person is experiencing illness, both physically and mentally. Data as a whole can also be added from various sources such as researchers, patients, and hospitals to create more structured and integrated database. However, in accordance with current capitalism, the fate of data users remains in the hands of the powerful ones.

Politically, the use of this data can indirectly shape public opinion. In accordance with their history of data usage, the commodity of reality offered to them will also shape their views on politics. Through communication between individuals, these opinions will intersect and can be either in conflict or in agreement. Thus, data can form collective opinion of the community or it is also this collective opinion that produces new data. Both of these patterns will be a consideration and response from the public regarding their interests.

Consequently, it can be concluded that data colonialism needs to be based on the concept of human consent or consent, whether someone agree for their personal data to be disclosed digitally or not. As a matter of fact, the systemic data structure removes this consent system and reduces the meaning of human life to being merely a means of consolidated interpersonal needs.

5.4 Axiological Review: Value Priority in Cryptocurrency Transactions

Philosophically, the formation of cryptocurrencies cannot be separated from a factual situation, or in Wittgenstein's terms it is called 'the state of affairs'. The fact itself is a form of factual event or circumstance that combines objects directly. In the crypto transaction system, the user as the subject involves objects including: money/funds as the object being exchanged, blockchain technology as the signified, password as the symbol/sign. From this perspective, crypto transactions fulfil scientific prerequisites that make use of facts. Axiologically, authors suggest that there are at least 5 values that become priority scales in crypto transactions, namely the value of trust, agreement, utility, pride, and the courage to speculate.

First, the most dominant value is trust. Although not based on a specific guarantee, cryptocurrency owners rely on an automated system or mechanism that runs by itself by relying on a machine. When owners or users decide to buy cryptocurrency, they naturally believe that it can function as a medium of exchange that can be freely used to buy commodities, both real and invisible, for example buying a piece of land in the metaverse.

According to Corbet, the decentralised nature of cryptocurrency means that data is not only stored on a single computer or server but is stored on millions of computers simultaneously. This means the blockchain cannot be tampered without the agreement of all the user's intersection points (nodes). Besides,

all transactions can be tracked and users can see the addition of new blocks of records every time which represents their transparency (Corbet, 2020: 3).

In addition, market trends also contribute to the formation of the value aspect of trust. According to data from a well-known auditing and accounting firm, Ernst & Young Global Ltd., the financial technology (or commonly abbreviated as FinTech) adoption index, the adoption of this service has grown rapidly from 16% in 2015 to 33% in 2017, and reached 64% in 2019 (EY, 2021). This indicates that public awareness of digital financial instruments is getting higher. Referring to the latest data in October 2022, Bitcoin as the most popular cryptocurrency now has a market capitalisation value of US$386 billion (Bankrate, 2022). Therefore, it can be said that the owners of this currency also feel confident or at least convinced by the trend of adding users. This also provides a strong persuasion effect for investment seekers.

Second, there is an agreement. This agreement can first be interpreted as a bond or guideline for a group of people or society. According to Caffentzis, the value measurement of money is conventional, so that its existence depends on consent and the preservation of this value across space and time which demands its stability. Thus, there is a bond between convention/agreement and its nature which is a synthesis of possessed qualities (Caffentzis, 2021, p. 19). In general, there is a consensus in the crypto user community to be ready to accept any plausible occurrence that might happen to their asset. One of the ways to achieve this consensus is through "mining" activities, namely finding new "sources" of currency, and is part of a 'proof-of-work system' (Corbet, 2020, p. 3). The agreement can also be explained in terms of the bond between the user/asset owner and the platform owner. In this regard, cryptocurrency transactions have a smart contract as a securing mechanism: an automatic code that executes a series of instructions which are then verified in blockchain technology. Smart contracts are automatic contracts (self-executing contracts) in which the terms of agreement between the buyer and the seller are written directly into the lines of code. The code and agreements contained therein exist throughout a distributed and decentralised blockchain network. The code controls its execution, and transactions are trackable but irreversible. Smart contracts allow for the creation of trusted transactions and agreements between multiple anonymous parties without the need for a central authority, legal system or external enforcement mechanisms (Frankenfield, 2022).

Third, utility value. For a group of people, cryptocurrency is an ideal choice because its financial system is not easily shaken by global financial systems and dynamics. The idea of cryptocurrency arose because the initiators thought that various types of currency that had existed before were no longer sufficient as a means of transaction in the digital era. The initiators/originators of this currency claimed that the government was no longer credible in fiscal management after World War II, when a large country like Germany experienced hyperinflation and currency devaluation. A series of economic debacles recurred, one of which was financial crisis 2008, occurring due to the permission given to banks to engage in hedge fund trading which triggered the explosion of mortgages (long-term debt instruments by giving mortgage property rights from creditors to debtors as collateral for their obligations), followed by creating affordable interest-based loans for subprime borrowers (who are not necessarily eligible to apply). Through these fiascos, investors thought that the government was not credible in fiscal management which caused them massive losses, coupled with monetary management by the central bank which provides abundance of rules or prerequisites limiting the space for movement and freedom for transactions. Thus the existing concept of money is reinterpreted by crypto initiators as a form of anticipation, as well as for business people and investors who have been expecting it to be more efficient and credible.

As a decentralised platform, cryptocurrencies allow individuals to engage in peer-to-peer or contractual unit financial transactions. Therefore, there is no need for trusted third-party intermediaries such as banks, monetary authorities, courts or judges who are considered to have the potential to disrupt the existing financial order and democratise finance (Hayes, 2022). The use of cryptocurrencies also allows transfers of large sums of money across national borders in just minutes while most banks require at least one working day. Unlimited supply meaning unlike fiat currency, it will not be affected by inflation and its value will not depreciate, giving a sense of security to the owners (Corbet, 2020, p. 3).

Fourth, the value of pride. People who own crypto assets certainly have their own pride that they want to highlight in their existence as owners of capital. As Lacey said, value is a highly valuable quality as well as a quality that forms the identity of a person or group of people; business or transactions in the digital world by a group of people also represent a process of forming identity, and even self-esteem. Thus, the recognition that appears has a value of pride, perhaps even self-satisfaction for its users. Cryptocurrencies can be used to buy necessities such as luxury cars (Teslas) and virtual art galleries (in which artists can use to hold digital exhibitions), but for some, this is not a primary need. Therefore, it can be said that crypto assets are valuable and especially valuable for those who have stability and accessibility.

Fifth, the courage to speculate (speculation values). Referring to several prerequisites for cryptocurrencies as mentioned by Jan Lansky, it can be seen that the independence of crypto as a currency or medium of exchange makes its movements highly volatile, and therefore carries a high risk for its users/owners. There are copious cases of disappearance of crypto assets stored as a form of investment. Until mid-2022, losses due to theft of crypto assets by hackers were estimated at 2 billion US dollars (DeVon, 2022). This does not include losses due to other modes of crime such as the pig butchering scam which has been rife lately. According to Corbet (2022), research on cryptocurrencies and block chain technology points to two fundamental issue characteristics: pricing abnormalities and the nature of vulnerability (bubble-like behavior). This indicates that crypto assets are indeed speculative in nature, contain legal abnormalities, and therefore allow exchange hacks, theft of investor assets, as well as regulatory issues.

Referring to Locke's statement regarding money, if money is able to maintain property and allow unlimited accumulation, of course it also bears the consequence of an insecure temporal space which is characterized by constant fear and danger and therefore, always opens opportunities for the creation of crime/cheating. (Caffentzis, 2021, p. 12). Bambang Prastowo in his book, Social Informatics, suggests 2 aspects that facilitate crime in the digital world via the Internet: the ease of duplicating crime modes and the opportunity to create programs and systems as instruments, either in whole or in part, from automated crime steps (Prastowo, 2022, p. 149).

Despite this, the potential of cryptocurrencies is not hampered because people who decide to invest in crypto circles understand that such activity carries high risks. Users see the other side of the coin which contains not only risks, but also opportunities. In addition, they also see the magnitude of the benefits to be gained from this opportunity. This is termed by Narayanan as seeking profits through seemingly invisible gaps ("minting money out of thin air") (Narayanan, 2016).

6   Conclusions

The use of cryptocurrencies presumably affects the status of morality and ethical issues in science that can lead to several implications as follows: First, technological innovation (just as cryptocurrency usage) implies the likelihood of moral status alterations and raises issues of scientific ethics. Second, cryptocurrency utilisation is prone to fraud because the virtual world allows for speculation, including gambling, through a process called 'mining'. Third, the plausibility to break away from government intervention and supervision aggravates money laundering and other criminal activities. Fourth, lack of communal/shared sense of responsibility as crypto users/owners are exempted from the obligation of taxation, prompting a loss of sense of responsibility (and perhaps belonging) as citizens.

References

Anderson, C. (June 23, 2008). 'The End of Theory: The Data Deluge Makes the Scientific Method Obsolete'. *Wired*. https://www.wired.com/2008/06/pb-theory/, retrieved on October 16, 2022.

Bahm, A. J. (1993). *Axiology: The Science of Values*. Rodopi.

Caffentzis, C. G. & Rekret, P. (2021). *Clipped Coins, Abused Words, and Civil Government: John Locke's Philosophy of Money*. Pluto Press.

Corbet, S. (2022). *Understanding Cryptocurrency Fraud: The Challenges and Headwinds to Regulate Digital Currencies*. De Gruyter.

Corbet, S. et al. (2020). *Cryptocurrency and Blockchain Technology*. De Gruyter.

DeVon, C. (August 19, 2022). 'Crypto hackers have stolen nearly $2 billion this year–Here's why it's a growing problem'. *CNBC Make It*. https://www.cnbc.com/2022/08/19/crypto-hackers-stole-billions-why-its-a-growing-problem.html, retrieved on October 16, 2022.

Dusek, V. (2008). *Philosophy of Technology: An Introduction*. Wiley.

EY. (2019). *Global FinTech Adoption Index 2019*. https://fintechauscensus.ey.com/2019/Documents/ey-global-fintechadoption-index-2019.pdf, retrieved on October 15, 2022.

Frankenfield, J. (July 20, 2021). 'Digicash'. *Investopedia*. https://www.investopedia.com/terms/d/digicash.asp, retrieved on October 15, 2022.

Frankenfield, J. (March 24, 2022). 'What Are Smart Contracts on the Blockchain and How They Work'. *Investopedia*. https://www.investopedia.com/terms/d/digicash.asp, retrieved on October 15, 2022.

Frondizi, R. & Wijaya, C. A. (1963). *Pengantar Filsafat Nilai*. Yogyakarta: Pustaka Pelajar.

Frondizi, R. (1971). *What is Value?: An Introduction to Axiology* (2nd ed.). Open Court Pub.

Hayes, A. (September 26, 2022). '10 Important Cryptocurrencies Other Than Bitcoin'. *Investopedia*. https://www.investopedia.com/tech/most-important-cryptocurrencies-other-than-bitcoin/, retrieved on October 15, 2022.

Jones, C. (September 21, 2022). 'Are There Too Many Cryptocurrencies'. *Cointelegraph*. https://cointelegraph.com/news/are-there-too-many-cryptocurrencies, retrieved on October 15, 2022.

Kasali, R. (2018). *The Great Shifting*. Jakarta: Gramedia Pustaka Utama.

Lacey, H. (1999). *Is Science Value Free?: Values and Scientific Understanding*. Routledge.

Lechte, J. (2001). *50 Filsuf Kontemporer: Dari Strukturalisme sampai Postmodernitas*. Yogyakarta: Kanisius.

Mitcham, C. (2005). *Encyclopedia of Science, Technology, and Ethics*. USA: Macmillan Reference.

Narayanan, A. (2016). *Bitcoin and Cryptocurrency Technologies: A Comprehensive Introduction*. Princeton University Press.

Pichl, L. et al. (2020). *Advanced Studies of Financial Technologies and Cryptocurrency Markets*. Springer.

Prastowo, B.N. (2022). *Informatika Sosial: Mengendalikan Teknologi untuk Tatanan Masyarakat yang Lebih Baik*. Bhuana Ilmu Populer.

Reiff, N. (2022). 'What Was the First Cryptocurrency?'. *Investopedia*. https://www.investopedia.com/tech/were-there-cryptocurrencies-bitcoin/, retrieved on October 15, 2022.

Royal, J. & Baker B. (October 06, 2022). '12 Most Popular Types of Cryptocurrency'. *Bankrate*. https://www.bankrate.com/investing/types-of-cryptocurrency/, retrieved on October 12, 2022.

Scharff, R. C. & Dusek V. (2014). *Philosophy of Technology: The Technological Condition: An Anthology* (2nd ed.). Wiley Blackwell.

Spier, R. (2003). *Science and Technology Ethics*. Routledge.

Stafford Global. *Finance 2.0: What is Cryptocurrency?* 22 April 2021, https://www.staffordglobal.org/articles-and-blogs/finance-articles-blogs/cryptocurrency-bitcoin-finance-banking/, retrieved on September 22, 2022.

Statista. Number of Cryptocurrencies Worldwide from 2013 to February 2022. https://www.statista.com/statistics/863917/number-crypto-coins-tokens/, retrieved on October 12, 2022.

Thatcher, J. E., & Dalton, C. M. (2022). 'What Are Our Data, and What Are They Worth?', dalam *Data Power: Radical Geographies of Control and Resistance* (pp. 46–64). Pluto Press. https://doi.org/10.2307/j.ctv249sg9w.9

Vigna, P. & Casey, M. (2015). *The Age of Cryptocurrency: How Bitcoin and Digital Money Are Challenging The Global Economic Order*. St. Martin's Press.