Risks and Regulation of Cryptocurrency during Pandemic: A Systematic LiteratureReview

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Abstract: - Cryptocurrencies differ from traditional financial assets as they are not governed by any higher authority, have no physical representation, are indefinitely divisible, and are not based on any tangible assets or country. While their popularity and use have surged over the years, they are still subject to an underlying risk. The purpose of this research is to investigate the regulatory approach for cryptocurrencies adopted around the world. To achieve the purpose of this research, extant literature is examined using a systematic literature review. Using a total of 49 Scopus indexed shortlisted articles, the extant literature on the various risks related to cryptocurrency and the regulatory approach adopted for the same was explored. The prior literature was classified into four thematic clusters of the regulatory approach to risks: pandemic, volatility, money laundering and cyber security. The findings suggest the regulations governing cryptocurrency are still at an infancy stage, and it still suffers from the challenge of limited transparency. The pandemic did not have a drastic impact on cryptocurrency. Cryptocurrencies are volatile in reaction to economic policy uncertainty and macroeconomic variables. To the best of the author's knowledge, this review paper is one of the few contributing to the gaps in the literature on the various risks and their associated regulatory approach to managing cryptocurrency.

Key-Words: - Cryptocurrency, Systematic Literature Review, Volatility, Pandemic, Cyber Security, Money Laundering.

Received: May 25, 2021. Revised: April 13, 2022. Accepted: May 10, 2022. Published: June 2, 2022.

1 Introduction

Cryptocurrency as its name suggests is crypted currency. Crypted means secured in such a way that contents are accessible only to sender and receiver. The origin of the word "crypto" is the Greek word "Kryptos" meaning hidden. The issue of security of communication has been addressed from time immemorable. Codes, pictures, secret ink, and the

like were used. The underlying strength of cryptocurrency is its encryption. Cryptography ensures data security with the use of computers and blockchain technology. The sender sends encrypted data. The recipient has a key that can convert it into readable mode. Cryptocurrency is a virtual currency, available only in electronic form. But it is not the digital currency which is the virtual form of fiat money issued by Governments. The said virtual currency is not encrypted, the bank account or wallet is safeguarded by a password. On the other hand, cryptocurrency is not issued by regulatory authorities; private players create the currency. The currency is encrypted.

The world of cryptocurrency is highly technical, and few people truly understand it. Simplistically put, it is a system that is not regulated by any statutory authority, it is said to be decentralized. It is managed by distributed consensus. The system oversees the creation and operation of cryptocurrency units. It defines origin, determines ownership, and facilitates transactions. Blockchains are lists of records, called blocks, that are linked and secured using cryptography. The blocks are continuously growing. They are linked and are secured using cryptography. The risk of fraud due to fraudulent alteration is difficult, as the change in one block needs to change in all subsequent blocks and collusion of a widespread network of people would be needed.

Bitcoin was the first cryptocurrency created. It was created by Satoshi Nakamoto (a pseudonym for an individual or group of individuals) in 2009. The cryptocurrencies created after Bitcoin are collectively referred to as alternative cryptocurrencies and called "altcoins." The website of coin market cap gives the list of cryptocurrencies traded with their name, symbol, market cap, price, circulating supply and volume [40]. There are about two hundred traded cryptocurrencies, the top five being Bitcoin, Ethereum, Binance Coin, Cardano, and Tether. Trading in cryptocurrency has ignited passion, greed, and crime reminiscence of the Gold Rush of 1848. People have raked in huge profits and such word-of-mouth stories have made cryptocurrency markets very alluring.

The Cryptocurrency world involves encryption, miners, proof-of-stake and proof-of-work models, hash functions, nodes, tokens, time stamping, blockchain, wallets of different kinds, keys and of course cryptographies. This paper does not describe and explore the nuances of the technical side of cryptocurrencies. It explores the risks involved, particularly the regulatory risk.

Risk is a future happening that is not desirable. To mitigate the possibility of the negative event or adverse impact of the event, risk management has evolved and is practised. However, it is often perceived as a compliance issue that can be solved by drawing rules [41]. Rule-based risk models do not at times work.

The entire system of cryptocurrency is managed by a community of people that are secretive and distrustful of each other. This system is going from strength to strength, but many are cynical of the sustainability of a system that is not built on transparency and mutual trust. There are hundreds of cryptocurrencies that are traded on exchanges and many of the exchanges are not licensed. Thousands of cryptocurrencies have existed at some point or the other. It has generated employment for thousands of people. An ecosystem has been created involving the stakeholders of miners, wallets, exchanges, payment companies and others. If the system created on the strength of blockchain for some reason collapses, it is bound to cause trauma to all world economies and create systemic risk in the financial markets. There is no ombudsman or redressal mechanism and damage to stakeholders is irreversible.

In addition, uncoordinated regulatory measures by different governments on crypto-assets may destabilize capital flows, while the IMF's primary mission is to safeguard the stability of the global monetary and financial system. These assets are altering the system profoundly by imposing an operational and financial risk when inadequately disclosed. By focusing on certain key elements, like licensing crypto-asset services and tailoring specifications to meet the needs of primary crypto applications, the IMF recommends comprehensive international standards to address risks associated with crypto assets. A currency substitution risk is more acute and immediate in developing markets, as crypto assets are replacing domestic currency and capital account management. There is a need for international collaboration to overcome technological, legal, regulatory, and supervisory challenges. Developing a regulatory approach for crypto-assets has become a focus of the IMF's strategy to carry out its mandate, in close collaboration with the Financial Stability Board.

History has proved that the most guarded jewels and paintings can be stolen. Espionage and spy network have given results. There is a murky world of blackmail and extortion. The cryptocurrency world cannot be an exception. Scammers sell dreams of financial freedom; tempt

by quick-rich examples., dupe people to pay in cryptocurrency for lucrative returns and disappear with the cryptocurrency. In 2020 in the US, about seven thousand people were cheated, and the victims lost in all about eighty million dollars. About seven thousand people in the US were defrauded in 2020, resulting in an eighty-million-dollar loss for them [42].

Laws are not predictive; they are always reactive. Many countries have accepted the existence of cryptocurrency and are still contemplating how to regulate it. Some have banned it, some have regulations, mandatory licensing, and registrations and a few have given total freedom. This paper is exploratory research on the regulatory approach by various countries and the risks emerging due to cryptocurrency mining. The past studies suggest the actors related to the cryptocurrency domain comply with certain rules but it is difficult to enforce the social norms and government policies [18]. Cryptocurrencies were created to overcome censorship. Bitcoin is the best-known cryptocurrency that has grown exponentially since 2008. It is one of the 1,500 cryptocurrencies existing around the world, of which Ethereum, Ripple, and Litecoin are also well known.

However, it is argued that annually around 76 billion dollars of illegal activity may involve Bitcoin [14]. Cryptocurrencies continue to be known for being the largest unregulated market in the world, reported that by early 2022, around 10 billion dollars' worth of cryptocurrencies were held by illicit addresses, with a substantial component in electronic wallets that are associated with crypto theft [39]. Therefore, the issues surrounding cryptocurrencies lead to no protection, liability clauses or insurers.

While there continues to be a call for more government regulation, its opposers argue that this would disrupt the true characteristics of cryptocurrencies which would lead to significant illiquidity and reduction of their value. The past studies argued on the regulators attempt to control nefarious activities such as tax evasion, terror financing, and money laundering, innovative activities will always be pursued by market participants through virtual currencies for overcoming regulatory practices [11]. The crypto asset market by nature allows for the creation of new currencies and exchanges thus promoting opening for anonymous transactions, such as crypto-funded visa cards by Coinbase exchange in the United Kingdom [37].

This research paper is structured as follows. Section 2 discusses the systematic literature review (SLR) outlined in the methodology to investigate the existing knowledge gaps related to the risks and regulations of the cryptocurrency. Section 3 provides the results of content analysis of research articles shortlisted for the study to depict the importance of Cryptocurrency regulations in developing and developed countries with the major challenges of the pandemic, money laundering and cyber security impacts on the changing market conditions. Lastly, section 4 presents the conclusion.

2 Research Methodology

This research conducts a systematic review of the literature emerging on cryptocurrency and its regulations. The methodology of systematic literature review (SLR) is adopted from the approaches used by [29], [22] [33]. SLR offers many advantages over the traditional literature review as it supports generating a standalone view on the desired topic and avoids any bias. Through SLR, the research can explore existing literature combinations, create definitions, and build on foundations for future research. SLR allows the researcher to follow a systematic methodology to synthesize the knowledge from existing articles [31]. SLR allows the researcher to adopt a predefined process that may vary in terms of stages. However, SLR results in the following four broad stages:

2.1 Plan the review
2.2 Identify and evaluate the articles
2.3 Extract and synthesize data
2.4 Disseminate the review results

This study adopts the above broad stages, and these are more broadly outlined below:

2.1 Stage 1: Plan the Review

2.1.1 Identify the Need

This study focuses on the SLR of the regulatory developments for cryptocurrencies in the developed and developing markets. Various motivations are driving the research objectives. First, a literature search was conducted on Google Scholar to explore if a topic existed with similar objectives. There were only two relevant contributions available in this field. The previous study findings from a literature review of prior studies on crypto laundering from a system thinking perspective [12]. A systematic review of empirical literature for all the possible topics associated with cryptocurrency already studied in

the past [10]. From this perspective, this study offers a novel approach to investigating the specifics of regulations of cryptocurrency. Second, the regulations are in various stages for the cryptocurrency markets, thus there needs to be a systematic study on the emerging developments addressing the various risks. Third, the analysis emerging from this study would foster future research directions.

2.1.2 Review Protocol

A review protocol was adopted to ensure a transparent and high-quality collection process of research articles. The Scopus database was used to collect research articles with keywords published up to October 2021. Scopus is considered one of the largest databases of high-quality peer-reviewed articles and advanced search functions [20] [8]. Scopus also ensures a high level of precision and is comprehensive to include all relevant published articles [24]. The keywords were derived from the research objectives and the initial scope of the literature. The six main keyword themes that were used as the search strings were, "cryptocurrency," "regulations," "pandemic," "volatility," "cyber security" and "money laundering."

Table 1. Inclusion and exclusion criteria

Criteria	Exclusion	Inclusion
Document type	Conference Paper, Book Chapter, Review Note	Article
Language	Russian, Spanish, Chinese, Turkish	English
Focus	Not pertaining to research objectives	Regulations

Source: [24]

In the search in the Scopus database, the keywords were investigated using the "Article Title, Abstract, Keywords" search field. As seen in Figure 1, the first search was run with the keywords, "cryptocurrency" and "regulations" that generated a total of 273 papers for the period 2014 to 30th October 2021.

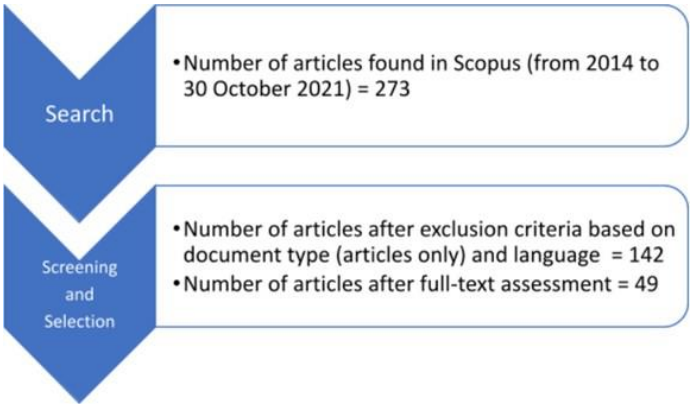

Fig. 1: Results of search, screening, and selection

These articles were further screened using a few exclusion and inclusion criteria that are outlined in Table 1. The exclusion criteria based on "document type" and "language" generated a total of 142 papers. We excluded conference proceedings, book series and trade publications from the search and those articles that were not in the English language. Further, the articles were analysed based on the keywords which further narrowed it down to forty-nine papers.

2.2 Stage 2: Identify and Evaluate the Articles

The article titles, abstracts and keywords were screened to identify the research papers closest to the research aims. The information was reviewed using the Scopus generated MS Excel database. The reliability of the process was ensured through two members of the research team separately coding the forty-nine research papers using the key themes of "pandemic," "money laundering," "cyber security" and "volatility." The results of both members were compared, and the final categorization of articles was confirmed that was as follows:

1. "cryptocurrency," "regulation", "pandemic" (6 research articles)
2. "cryptocurrency," "regulation", "money laundering" (25 research articles)
3. "cryptocurrency," "regulation", "cyber security" (5 research articles)
4. "cryptocurrency," "regulation", "volatility" (13 research articles)

Figure 2 presents the share of research articles addressing the various cryptocurrency risks. The risk of money laundering has the highest number of published articles.

2.3 Stage 3: Extract and Synthesize Data

2.3.1 Data Extraction

The data extraction was undertaken through the Scopus database which included the research articles relevant to this research. The output from the database was generated in a comma-separated values (CSV) file in MS Excel format. The MS Excel CSV file included the information presented in Table 2.

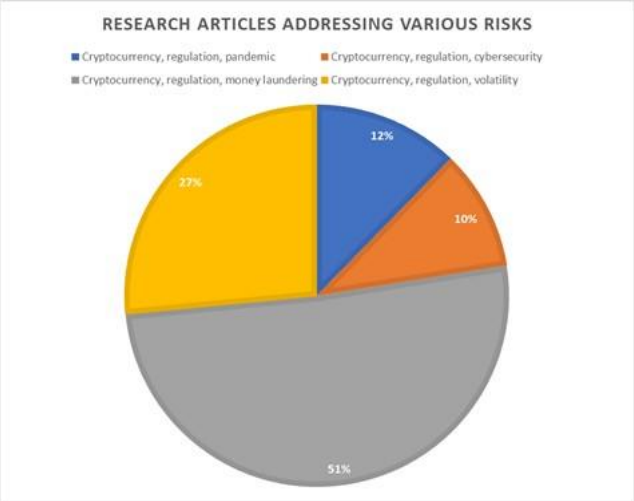

Fig.2: Research articles addressing various risks

Table 2. Extracted information from the Scopus database

Elements	Contents
Citation information	Authors, Author(s) ID, Title, Year, Source Title, Volume, Issue, Page start and end number, citations received by the article, DOI, EID
Abstract and keywords	Abstract, author keywords, index keywords publisher, document type, publication stage, open access
Other information	

2.3.2 Data Synthesis

The selected articles were synthesized using descriptive and thematic analysis [33]. The research adopted the NVIVO software to conduct the keyword and content analysis. The themed analysis results in synthesizing information, outlining main contributions, and identifying the key themes related to cryptocurrency risks.

2.4 Stage 4: Disseminate the Review Results

To the best of our knowledge, this is one of the first studies to conduct SLR of cryptocurrency and its related regulations. It provides state of the art insights into the way regulations are being developed or proposed to address the various risk related to cryptocurrencies. The presentation of the results is discussed in the following section.

3 Results and Discussion

3.1 Cryptocurrency Regulation in Developed and Developing Countries

It has been seen that developed countries and developing countries have different stands when it comes to regulating cryptocurrency in their countries, few of the examples of some countries are stated below: Developed countries: The United States, China, and The United Kingdom.

The United States: While each state has their regulations, overall, the sentiment is positive in the United States. A licensing framework called BitLicense was announced by the New York State Department of Financial Services, requiring companies to gain a license from the department to transact in crypto.

China: From accommodating cryptocurrencies initially to banning them completely as of June 2021, China has been the toughest on cryptocurrencies. As a result, 40 per cent of total crypto mining operations in China have been shut down. Despite this, blockchain technology is widely supported and a digital Yuan is in development, as well as trials of centrally regulated cryptocurrency [42].

The United Kingdon: In the UK, there is no legislation regulating cryptocurrencies, and the market is regulated by the Financial Conduct Authority (FCA), which grants licenses to exchanges and businesses, which handle crypto assets. The FCA has a "stringent set of rules," in particular for derivatives trading in cryptocurrency. Gains or losses on cryptocurrency transactions are subject to capital gains tax in the UK, and in addition, firms must comply with anti-terrorism financing (CTF) and anti-money laundering (AML) regulations.

Developing countries: European Union, El Salvador, Singapore

European Union: Regulations within the European Union are complicated, and member nations and the Union have overlapping concerns. While most EU countries have ‘soft-touch’ frameworks, the bloc has

begun to consider a consolidated framework on crypto. The draft Market in Crypto-Assets Regulation (MiCA) legislation will treat crypto as regulated financial instruments and thus require prior approval from regulators.

El Salvador: The South American country became the first to officially adopt Bitcoin as legal tender. The government claims the move will give many citizens access to banking services for the first time. The country has also accepted US Dollar as a legal tender for the past 20 years. Economists and many international bodies like World Bank, and IMF have been criticizing the country's bitcoin adoption.

Singapore: It has implemented licensing requirements and complies with Anti-Money Laundering and Counter-terrorism Financing for transacting in cryptocurrencies under its Payment Services Act.

It has been seen that developed countries and developing countries have different stands when it comes to accepting cryptocurrency as legal tender in their countries, but it can be said that countries are continuously trying to bring cryptocurrency into regulatory aspect to save themselves and their investors from trapping in them, bringing cryptocurrencies in regulatory lenses help to manage them better and also leads to elimination of weak and improper cryptocurrencies. Developed countries like the US, UK, and China have brought cryptocurrency into regulatory lenses and Anti-money laundering, but have not given any statements to accept cryptocurrency as legal tender by the government. Among the developed countries, China has proposed to launch its central cryptocurrency along with its digital currency Yuan. Discussions are regularly going around amongst the global financial bodies like the World Bank and IMF regarding standardised regulation of crypto-currencies and how countries should follow them. However, certain developing American and European countries have already started to accept them as legal tender and they are receiving heavy criticism from such financial bodies. Certain developing countries like El Salvador, Panama, Lugano(Switzerland), and Honduras(SEZ) can be seen as countries that are accepting cryptocurrency as legal tender along with certain regulatory frameworks launched along with them, some developing countries are having a more affirmative approach towards acceptance of cryptocurrencies possibly because they think cryptocurrency can help them to improve financial inclusion, remove poverty, and fight against corruption resulting in the overall economic growth of the country, however, there is no such real-life case study to prove that crypto-currencies help in eradicating poverty and corruption. It can be said that the developing countries accepting crypto-currencies as legal tender can be tax-haven countries and may have been imposing such laws to lure investors over the world. Certain Asian Developing countries like India, Singapore, Malaysia, and Indonesia are having discussions and improvements in regulating and monitoring the crypto-currencies through the lenses of Anti-money laundering and Counter-Terrorism Financing first, they have not stated any plans to accept them as legal tender, where India has started crypto traders to tax on the profit gained in crypto-currency and the central bank is also planning to launch a digital currency [15].

3.2 Cryptocurrencies Regulations and Pandemic

During a pandemic, the price dynamics of any asset depend on the type of market [32]. There is a correlation between the Coronavirus Panic Index and world currencies like the Euro, British pound, and Renminbi of China, as well as between the moves of the Bloomberg Galaxy Crypto Index [34]. The global pandemic of Covid-19 has affected financial markets worldwide [1]. Although cryptocurrency could have been viewed as a perfect asset to hedge high uncertainty downturn periods, since public companies and fiat currencies are correlated with economic conditions [32], the Covid-19 pandemic negatively impacted cryptocurrency returns for investors worldwide [36]. In recent Covid-19 developments, a lot of new literature has focused on the impact of the pandemic on worldwide financial markets, where even cross-hedge strategies can fail in critical situations and stress periods, as the market is highly influenced by herd behaviour, which may weaken under normal circumstances [34]. Despite the lack of connection between digital currency and the real economy, cryptocurrency only experienced a brief period of panic in comparison to other financial assets in the wake of COVID-19 [32]. Behavioural science psychology also informs the results and outcomes of a price reaction, since co-movements indicate no room is left for diversification benefits when panic selling or panic buying occurs [34]. When considering the hedging properties of cryptocurrencies, cryptocurrency should not be considered an alternative investment tool since there is no relationship between them and the real economy [32].

3.3 Cryptocurrency Regulations and Money Laundering

Crypto businesses pose two major challenges to the economy; first, they pose a high risk of terrorist financing, and second, they raise new regulations imposed by the government [4]. While the modified Anti-Money Laundering (AML) laws are insufficient to address all the provisional risks of cryptocurrency, there is a high time for states to frame this business under a new law and bring about a revolution in the future [9]. To avoid the scrutiny of falling under AML laws, many financial institutions don't accept cryptocurrency as a mode of transfer payments. In relation to
crypto-assets, Germany, Switzerland, and The UK are all highly susceptible to money laundering. Switzerland is considered a crypto valley and encourages such transactions, Germany has been restricting it through provisions, but still, reports are made, and The UK is the strictest on cryptocurrencies, but it is home to a large amount of money laundering. A uniform framework and government oversight are needed to prevent misinformation and misuse [1]. The globalization of currency has revolutionized transnational business and crime methods at the same time [35]. In addition to making the tasks convenient, it has also slowed traditional regulatory approaches in terms of verifying the legal status of money that is being transferred, creating an uncertain environment [1].

The cryptocurrency relies on secrecy, decentralization, and lack of responsibility, making it capable of conducting operations instantly, which would not be possible before, these digital and decentralized features make it difficult for them to regulate for law agencies to regulate the financial system also the consumer-investor protections are challenged as well [9]. Such a hidden use of crypto assets creates a sense of doubt and questions can be raised if it is linked to cybercrimes such as ransomware, hacking and digital wallets, to combat the growing threat of ransomware attacks and other cybercrimes, the White House is considering a wide range of oversight of the cryptocurrency market, the US national security advisers will gather officials from 30 countries [27]. China has banned cryptocurrency business and online payments, consisting of trading, clearing, and settling, but it has not banned the possession of digital currency [30]. Cryptocurrencies are the perfect alternative for layering incriminated funds through crypto ATMs to exchange Bitcoins for cash with the ATMs found in almost every jurisdiction, money launderers also use unregulated crypto exchanges that bypass the KYC requirements for identifying the beneficial owner of transactions [18]. Regulations have also resulted in the shutting down of crypto start-ups leaving the market, after the implementation of the fifth AML directive in Europe and effectively harming the domestic economies by driving out innovation [18].

As a result of the following research gaps, it can be suggested to introduce a reform of extending common law to cryptocurrency and Blockchain regulation by global organizations such as the World Bank and IMF and to clearly state the penalties if laws aren't followed. Research can be done on the differences in AML laws between democratic and autocratic countries. The success and consequences of implementing AML laws in some European countries such as Malta can be studied. Research can be conducted to determine if countries that allow crypto transactions are tax havens for illegal money, or if they lack legal expertise.

3.4 Cryptocurrency Regulations and Cybersecurity

An Initial Coin Offering (ICO) is one way for small and medium-sized enterprises (SMEs) to access financing, given that banks are difficult to access. The regulation of ICOs in European countries was deemed to be beneficial for the future development of financial regulations [21]. The ICO process is an option for online money valeting [28]. ICOs are more adaptable to SMEs, while IPOs are more adaptable to large entities [21]. A lack of uniformity in government regulations, insufficient tax regulations, and inadequate cyber security are the greatest obstacles facing issuers. ICOs are seen as a barrier to development in Ukraine due to the lack of regulation [21]. In North America, Asia, and Europe, most ICOs are conducted due to government regulation and legal frameworks specific to cryptocurrency. ICO companies are required to comply with regulations that govern investment activities, such as the Prospectus Directive and the Markets in Financial Instruments Directive (MiFID), the Alternative Investment Fund Managers Directive (AIFMD) and the Fourth Anti-Money Laundering Directive [17]. There are four stages required to minimize the risks associated with ICOs: high volatility, superficial due diligence, minimal governance control, and the lack of investors. Despite Bitcoin being classified as a digital

property right, BRICS countries are unsure, at present, whether cryptocurrency is a financial asset [13]. Nevertheless, there are also some security concerns involved when transacting in a digital medium. The use of Bitcoin by cybercriminals as a form of payment creates an opportunity to peek inside their financial operations, as demonstrated by the ransomware ecosystem, which has extorted more than 16 million USD from 20,000 victims in the last two years [38].

Several countries are overcoming the security barrier by issuing national digital currencies to transact globally with members. National currencies are being discussed, the possibility of creating a "currency payable" of the BRICS (RUIND), a new trend is state-sponsored cryptocurrencies being discussed in all BRICS countries, a common cryptocurrency, and using Blockchain technology [19]. In order to carry out international transactions, an international agreement is necessary, which defines the parameters of digital currency issuance based on Blockchain technology, transparency and protection of such financial assets [13].

According to the above research gaps, we have some recommendations for future researchers. In order to investigate the reason for such low usage in some countries, a comparative study based on consumer mindset can be conducted on the skewed data of the cryptocurrency market among various countries. For cryptocurrencies to become official in the world economy, each country must establish a monitoring agency that oversees all digital transactions and communicates them to the international governing bodies. To have a detailed discussion with member countries about cryptocurrencies, country leaders and intellectuals must raise the topic at the G7, G20 and World Economic Forum summits.

3.5 Cryptocurrency Regulations and Volatility

Price predictions can be divided into two categories: market-based predictions and macro-based predictions. Macro-based indicators include technical indicators, the three-factor price model for crypto, and volatility indexes. Global economic fluctuations and political instability are macroeconomic factors [23]. Economic policy uncertainty index (EPU) and cryptocurrency volatility are linked, where the China EPU predicts cryptocurrency volatility, a change in China EPU is negatively associated with Bitcoin and Litecoin volatility. There is no clear effect of change in China EPU on the volatility of Litecoin and Bitcoin after the Chinese Government's crypto ban policy in September 2017, but perhaps a positive effect as policy changes may increase the uncertainty of such trading. Increasing the EPU induces investors to trade their fiat money for Bitcoin, thereby increasing the liquidity, which reduces volatility. EPU and cryptocurrency are negatively correlated, so cryptocurrency can be used as a hedge against EPU risk [23]. EPU is negatively correlated with various financial assets, such as (cryptocurrency, stocks, bonds, and commodities), indicating the impact of EPU on portfolios [2]. Bitcoin's volatility is affected by news regarding regulations and hacking attacks against crypto exchanges, resulting in more volatile bitcoin investments, demonstrating that US macroeconomic news and announcements like monetary policy and budget decisions have little impact on bitcoin volatility, whereas bitcoin volatility is directly correlated with consumer confidence. As there is no central authority that is in charge of maintaining bitcoin's price quotation, it is affected by demand and supply that are available in the market and various semi and unregulated factors, leading to a serious issue with theorists who want to investigate the pricing behaviour. Moreover, its volatility increases one day before the publication of a news article relating to any regulations, as observed by various articles in the Financial Times newspaper [25] . After the price crash, EPU has a negative impact on optimal weighted portfolio [26]. Before the price crash, EPU positively impacts optimally weighted [26]. Cryptocurrency volatility can also be a result of cyber-attacks [6], where ransomware attackers generally demand payments in cryptocurrencies, resulting in huge transactions. According to [25], the annualized standard deviation for Bitcoin is 71.12 per cent. Annualized standard deviations of commodities are 25.40 per cent, equities are 20.60 per cent, fixed income is 3.10 per cent, and foreign exchange is 10.30 per cent which is very low compared to the standard deviation of cryptocurrencies [3].

Based on the above research gap, we suggest that research should be done in areas such as performing a further advanced quantitative analysis and finding out if the volatility is seasonal every year during a specific period or the volatility level in other cryptocurrencies. A comparison of how much volatility is observed in stock markets, bond markets, or any other market

during that period, such as a commodity or fiat currency. In addition, a study can be performed if volatility is affected by news from any other country in addition to those listed above. Researchers can investigate the volatility of the cryptocurrency by looking at the power shortage since one bitcoin requires so much energy to mine. By creating a scenario analysis, it is possible to compare the volatility in the bond market and cryptocurrency market.

4 Conclusion

This study critically reviewed the literature on the development of the regulatory approach toward risk associated with cryptocurrency. This objective was investigated using the systematic literature review (SLR) using the articles published in Scopus indexed database. The SLR stages involved keywords and content analysis of the forty-nine shortlisted papers. The SLR highlights there are four main risks of cryptocurrencies that requires a regulatory approach. The major risks prominently investigated in the research article include pandemic, volatility, cyber security, and money laundering. While the pandemic had a widespread negative impact on traditional financial assets, cryptocurrencies only were briefly affected. The money laundering regulations have insufficient coverage of cryptocurrency and thus the risks remain relatively high. While the threat of cybersecurity looms over cryptocurrencies, the motivation of the countries to issue digital currency using blockchain technology is likely to overcome this risk, however, this is yet to materialise. The research on volatility has covered market-based and macro-economic indicator risks affecting cryptocurrencies. The results of the studies have indicated a relationship with various factors one of which is economic policy uncertainty. These risks are yet to have regulations being made available for cryptocurrency. The findings of this study have implications for regulators, practitioners, investors, professionals, and academicians. The regulatory authorities must ensure providing transparent structures that boost the confidence of the investors. With the various risks facing cryptocurrencies, regulatory authorities must develop laws for mitigating the same. Due to the shortcomings of the regulations, practitioners will continue to face challenges in cyber security threats. The risk-averse investors on the other hand would continue to avoid the cryptocurrency market as it does not offer a viable investment opportunity. For academicians, the findings of this study open avenues for future research on various external factors such as the pandemic, or market volatilities that may affect the cryptocurrencies. This study suffers from certain limitations. The research articles included in this study were from the Scopus indexed database. This results in eliminating articles with relevant content in the field of cryptocurrency. Though this is true, the Scopus database continues to offer highly respected and peer-reviewed articles. The shortlisting of articles under the structured literature review stages is considered a subjective process. However, to overcome this limitation, reliability was ensured for coding the articles by two independent researchers. The findings suggest SLR is the starting point for future research areas.

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