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Blockchain in Around the World

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Abstract: In recent years, global interest in blockchain technologies and their possible impact have permeated the public consciousness. Blockchain is essentially software made up of records of digital transactions that are grouped together into "blocks" of information and shared securely across computers on a shared network. Blockchain pilot programs are being implemented around the world in a variety of ways. Numerous nations are presently preferring the utilization of blockchain technology. The rapid growth of blockchain has prompted governments around the world to explore ways to regulate it. This paper summarizes the current blockchain adoption and regulation in ten countries.

Keywords: blockchain, distributed ledger technology, Bitcoin, nations of the world.

INTRODUCTION

The world's most valuable resource is no longer oil, but data. The Internet and smartphones have made data abundant, ubiquitous, and far more valuable. Blockchain is a database technology that records and stores information in blocks of data that are linked, or "chained," together. Data stored on a blockchain are continually shared, replicated, and synchronized across the nodes in a network. Most blockchains (and Bitcoin is the biggest) are what we call permission-less systems. With a compound annual growth rate of 56.3%, the blockchain industry will be worth $163.83 billion by 2029. As Bitcoin attracted considerable amount of attention in recent years, its underlying core mechanism, namely blockchain technology, has also quickly gained popularity [1].

Due to several factors existing in each country around the world, from economic to regulatory, there are countries that are more ahead of the curve in terms of Blockchain adoption. A practical usage of cryptocurrency around the globe is what differentiates it from every other major currency whether it's euro, dollar, or any other. Numerous country-based financial organizations are putting resources into blockchain technology to make a more productive organization to deal with economic exchanges.

OVERVIEW OF BLOCKCHAIN

Blockchain (BC) technology is a permanent record of online transactions. It is a distributed tamper-proof database, shared, and maintained by multiple parties. It is a new enabling technology that is expected to revolutionize many industries, including business. It has the potential for addressing significant business issues. The BC technology allows participants to move data in real-time, without exposing the channels to theft, forgery, and malice.

The term "blockchain" refers to the way BC stores transaction data – in "blocks" that are linked together to form a "chain." The chain grows as the number of transactions increases. Since every entry is stored as a block on a chain, the care you receive is added to your personal ledger. The first Blockchain was conceived in 2008 by an anonymous person or group known as Satoshi Nakamoto, who published a white paper

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introducing the concept of a peer-to-peer electronic cash system he called Bitcoin [2]. A typical blockchain architecture is shown in Figure 1 [3]

At its core, blockchain is a distributed system recording and storing transaction records. In a blockchain system, there is no central authority. Instead, transaction records are stored and distributed across all network participants. Rather than having a centrally located database that manages records, the database is distributed to the networks and transactions are kept secure via cryptography. BC eliminates the need for a middleman that traditionally may facilitate such transactions. Figure 2 shows how blockchain works [4].

Fundamentally, blockchains are distributed digital database that record and maintain a list of transactions taking place in real time. They may also be regarded as decentralized ledgers that sequentially record transactions or interactions among users within a distributed network. They have the following properties [5]:

- Firstly, they are autonomous. They run on their own, without any person or company in charge.
- Secondly, they are permanent. They are like global computers with 100 percent uptime. Because the contents of the database are copied across thousands of computers, if 99 per cent of the computers running it were taken offline, the records would remain accessible and the network could rebuild itself.
- Thirdly, they are secure and tamper-proof. Each record in blockchain is time stamped and stored cryptographically. The encryption used on blockchains like Bitcoin and Ethereum is industry standard, open source, and has never been broken.
- Fourthly, they are open, allowing anyone to develop products and services on them.
- Fifthly, as blockchain is a shared system, costs are also shared between all of its users.

The blockchain was designed so transactions are immutable, i.e. they cannot be deleted. Thus, blockchains are secure and meddle-free by design. Data can be distributed, but not copied. When it comes to digital assets and transactions, you can put almost anything on a blockchain. Different scenarios call for different blockchains. Blockchain is used in different areas such as depicted in Figure 3 [6].

The BC technology currently has the following features [7,8]:

1. *Peer-to-Peer (P2P) Network:* The first requirement of BC is a network, an infrastructure shared by multiple parties. This can be a LAN at a small scale or the Internet at a large scale. All nodes participating in a BC are connected in a decentralized P2P network. Transactions are broadcast to the P2P network. Due to some limitations of P2P networks, some vendors have provided cloud-based BCs.
2. *Cascaded Encryption:* A BC uses encryption to protect transaction data. Blocks are encrypted in a cascaded manner, i.e. the encryption result of the previous block is used in encrypting the current block. The BC is secured by public key cryptography, with each peer generating its own public-private key pairs.
3. *Distributed Database*: A BC is digitally distributed across a number of computers. Each party on a BC has access to the entire database and no single party controls the data or the information. Since BC is decentralized, there is no need for central authorizes such as banks.
4. *Transparency with Pseudonymity*: Each node or participant on a blockchain has a unique 30-plus-character alphanumeric address that identifies it. Users can choose to remain anonymous or provide proof of their identity to others.
5. *Irreversibility of Records:* Once a transaction is entered in the database and the accounts are updated, the records cannot be altered. Records on the database is permanent, chronologically ordered, and available to all others on the network.

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There are two types of Blockchains: public and private. Public Blockchains are cryptocurrencies such as Bitcoin, enabling peer-to-peer transactions. Private Blockchains use Blockchain-based platforms such as Ethereum or Blockchain-as-a-service (BaaS) platforms running on private cloud infrastructure. A private BC is an intranet, while a public BC is the Internet. Companies will be disrupted the most by public Blockchains.

BLOCKCHAIN AROUND THE WORLD

Blockchain is a significant global innovation. As blockchain has become a more significant factor in the global investment landscape, countries have taken different approaches to regulate it. Figure 4 shows the legal status of bitcoin worldwide [9], while Figure 5 displays the venture funding raised by blockchain [10]. Currently, countries like Japan and the United States are topping the rankings for accepting and implementing cryptocurrencies. We will consider how blockchain is applied in ten different nations [11-15].

1. BLOCKCHAIN IN THE UNITED STATES

The United States is home to the most extensive crypto ATM network. The country plays a significant role in the adoption of cryptocurrency and blockchain.

Cryptocurrency exchanges are legal in the United States and fall under the regulatory scope of the Bank Secrecy Act (BSA). Nearly 40% of the all blockchain startup industry is found in the US alone. There has yet to be a cohesive regulation system since laws vary greatly from state to state. The Securities and Exchange Commission (SEC) has already moved toward regulating the sector. We will likely witness US regulators coming down hard on cryptocurrency in the coming years. The present Biden administration seeks to tackle illegal cryptocurrency activity. The government also expects to expand investment in blockchain development ten times more than before. The US is adopting blockchain for digital transformation and innovation in a number of departments. The US Navy is developing a supply chain management tool on blockchain for its logistics. DARPA, the Defense Advanced Research Projects Agency, is investigating the use of blockchain for secure military communications. The Centers for Disease Control (CDC), has been investigating the use of blockchain to track public health outbreaks or other medical trends, such as prescription use.

2. BLOCKCHAIN IN EUROPE

In the European Union, cryptocurrency is widely considered legal, but rules for exchange as well as taxation are different across member states. The European Central Bank is considering the possibility of issuing its own digital currency. It classifies bitcoin as a convertible decentralized virtual currency. In April 2023, Parliament approved measures that allow legislation requiring certain crypto service providers to seek an operating license. This legislation is intended to give regulators the tools they need to track crypto being used for money laundering and terrorism funding. According to the European Central Bank, traditional financial sector regulation is not applicable to bitcoin because it does not involve traditional financial actors. The EU is actively exploring further cryptocurrency regulations. The EU has passed no specific legislation relative to the status of bitcoin as a currency, but has stated that VAT/GST is not applicable to the conversion between traditional (fiat) currency and bitcoin. The European Union has officially launched the European Digital Infrastructure Consortium (EDIC), which will drive blockchain policy to move Europe's "digital decade" forward.

3. BLOCKCHAIN IN THE UNITED KINGDOM

The United Kingdom comes second in the list of countries that possess the most blockchain-based businesses in the market. While there are no cryptocurrency-specific laws in the UK, the country considers cryptocurrency as property (not legal tender), and crypto exchanges must register with the UK. Crypto

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derivatives trading is banned in the UK as well. There are cryptocurrency-specific reporting. The country is planing to work on its guidelines against identity fraud and delayed monetary services with the appropriate execution of blockchain technology . Additionally, between 2017 and 2018, more than 500 million euros investments were spent on British-based blockchain startup companies. The UK government has been exploring blockchain use cases for many years, seeing its potential in delivering a number of initiatives around safety, trust, transparency, cost and citizen experience. The UK government aims to be at the forefront of blockchain-related technological innovation for some time to come. The UK Department of Work and Pensions is investigating using blockchain technology to record and administer benefit payments.

4. BLOCKCHAIN IN CHINA

China is one of the top countries using blockchain technology. It was the first economy to issue its national currency on the blockchain in early 2021.The country filed massive 225 blockchain patents in 2017, followed by 91 in the US. People's Bank of China (PBOC) bans crypto exchanges from operating in the country, stating that they facilitate public financing without approval. China placed a ban on Bitcoin mining in May 2021 and on cryptocurrencies in September 2021, forcing many engaging in the activity to close operations. The crackdown issues in China are generally identified with the areas related to blockchain technology such as fake conduct, token sales, illegal tax laundering, and avoidance of capital controls. Mobile manufacturers in China are racing to launch blockchain based smartphones. All these instances show that the Chinese government has taken an official interest in Blockchain application. China worked to develop the digital yuan (e-CNY) and in August 2022, it officially rolled out its central bank digital currency (CBDC) pilot test program.

5. BLOCKCHAIN IN INDIA

India is one of the nations that do not consider cryptocurrencies legal. It remains on the fence regarding crypto regulation, neither legalizing nor penalizing its use. It continues to hesitate to ban crypto outright or to regulate it. The Federal Government in India will encourage blockchain but is not keen on cryptocurrency trading. Much of the concern in India is about money laundering and other criminal offenses. India continues to be in a dilemma on whether to ban crypto outright or force it into regulation. However, India launched its tokenized rupee pilot program in late 2022.

6. BLOCKCHAINS IN RUSSIA

Right now, it seems like everything related to cryptography in Russia falls under the supervision of national agencies such as the Federal Security Service and others. Although the certification is not legally required, it is somewhat suggested that transactions between blockchain participants will have no legal significance if they are not certified.

7. BLOCKCHAIN IN CANADA

While crypto is not considered legal tender in Canada, the country has been more proactive than others about crypto regulation. Canada became the first country to approve trading Bitcoin on the Toronto Stock Exchange. In Canada, a strong focus can be seen in utilizing blockchain for identity and credentials management. The Canadian government has already piloted blockchain technology for its own digital credential management system. Canada is testing the Known Traveller Digital Identity System in collaboration with the World Economic Forum and the Netherlands. The program uses biometrics, cryptography and blockchain to let travelers control and share information. In 2021, the Canadian Securities Administrators (CSA) published guidance for crypto issuers that own or hold crypto assets.

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8. BLOCKCHAINS IN AUSTRALIA

Tourism is one of Queensland's most important industries and among the major source of revenue generation. Cryptocurrencies as well as Bitcoin are classified as property, subjecting them to capital gains tax. Exchanges are allowed to operate in the country, provided that they register with the Australian Transaction Reports and Analysis Centre. This opens many doors for investors, considering the fact that even Australian government provides specific funds for development and improvement of blockchain standards in this country. The government has just started to get involved in this sector and has come up with a national blockchain roadmap as part of its big plan. This five-year plan is expected to bring certain regulatory mechanisms. From this, we can see that Australia is one of the most progressive nations in this field. In 2021, Australia announced plans to create a licensing framework around cryptocurrency and potentially launch a central bank digital currency. Food fraud, which costs Australia billions each year, could also be addressed with a blockchain-based supply chain. Centralized health records could be made easily accessible, safe and private via a blockchain solution. In the state of South Australia, an election to appoint a government advisory council was conducted using blockchain technology, illustrating how blockchain might one day be used to broaden blockchain voting mechanisms and enhance citizen input.

9. JAPAN

Japan is among the very first adopters of blockchain technology. Japan has been a crypto-center from the beginning. It takes a progressive approach to crypto regulations. The innovator of Bitcoin is said to be Japanese due to his name "Satoshi Nakamoto." The Japanese government empowers the implementation of blockchain technology, attempting to lead in worldwide innovative developments. Japan takes a progressive approach to crypto regulations. Right now, Japan is the only nation to have legitimate lawful cryptocurrency guidelines. In April 2017, The Tokyo government passed a law perceiving Bitcoin as a legal currency. Further, as indicated by the Japanese Financial Services Agency (FSA), over 3.5 million people exchange cryptocurrencies and accept the digital asset as an actual asset.

10. BLOCKCHAIN IN SINGAPORE

This island state is an aspiring Smart Nation with its robust methodology that tries to change this previously known fishing town into a hub of the research facility. It classifies cryptocurrency as property but not legal tender. The Singapore government is perceived as more business-accommodating and transparent in comparison to other countries. Singapore is a leading country in blockchain adoption, with the government investing heavily in blockchain research and development, causing many blockchain businesses to choose to incorporate there. It supports a few new blockchain-based businesses. Their financial regulatory body, the Monetary Authority of Singapore (MAS), encourage blockchain and cryptocurrency adoption. Its primary role is license and regulate exchanges and monitor and mitigate the crypto industry risks without hindering technological innovation. MAS has launched a S$12 million Singapore Blockchain Innovation Programme (SBIP) in the continued effort to build the country's blockchain ecosystem. Singapore gets its reputation as a cryptocurrency safe haven because long-term capital gains are not taxed. It has already developed a number of blockchain concepts, such as for inter-bank and cross-currency payments with Europe and Canada. When it comes to blockchain advancement and applications, it has a neck-to-neck rivalry with China and Japan.

11. BLOCKCHAIN IN NIGERIA

The country is the most populous African nation of almost 200 million people. It is among the top countries with a high global crypto adoption index. The Nigerian population faces an uncertain domestic situation, with high inflation and depreciation of the country's fiat currency. African nations are no strangers to the use of digital solutions for money transfers. In early 2017, the Central Bank of Nigeria warned financial institutions

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not to use, hold or trade virtual currencies pending "substantive regulation or decision by the (Central Bank of Nigeria) as they are not legal tender in Nigeria." Nigeria has a huge commercial market for crypto. More and more commerce is done on the rails of cryptocurrency, including international trade with counter parties in China. The adoption of blockchain and cryptocurrency has experienced a clear uptrend in Nigeria, especially after the 2022 crypto market crisis when the country emerged as one of the most crypto-curious nations. In October 2021, the Central Bank of Nigeria launched the eNaira, a blockchain-based central bank digital currency (CBDC) pegged to the country's national currency, the naira.

BENEFITS

In countries with historically weak currencies, including several Latin American and African countries, Bitcoin has become popular with populist leaders. Law enforcement agencies and regulatory bodies around the world are working hard, trying to develop strict guidelines for the safe and reliable deployment of these digital assets. Blockchain can enable businesses to solve issues with real-time data access, partners' privacy, and traceability.

CHALLENGES

While cryptocurrency has existed since 2009, governments and regulators are still working out ways to govern its uses. Leaders across industries have seemed unsure what to do with blockchain technology. The studies have shown that most developing and well-established nations are dominating the space of cryptocurrency and blockchain technology. Financial inclusion is a challenge to developing nations. The adoption of blockchain has not been equal among the different nations. Some nations have made giant strides in the blockchain space, while others are still playing catch up. Governments around the world are facing new policy and regulatory challenges, not only in ensuring compliance but also in managing issues arising from digital disruption.

CONCLUSION

Blockchain is the subject of extensive international interest and attention over the past few years. Every nation develops on its own regulations on blockchain. Mass blockchain adoption will require a combination of global innovation and cooperation. For every country, there is a government trialing a blockchain pilot. Blockchain universities around the world are advancing the careers of tech aspirants. Global Blockchain Business Council (GBBC) is the largest leading industry association for the blockchain technology and digital assets community. Launched in Davos in 2017, GBBC is a Swiss-based non-profit, with more than 500 institutional members. More information about blockchain around the world can be found in the books in [16-18].

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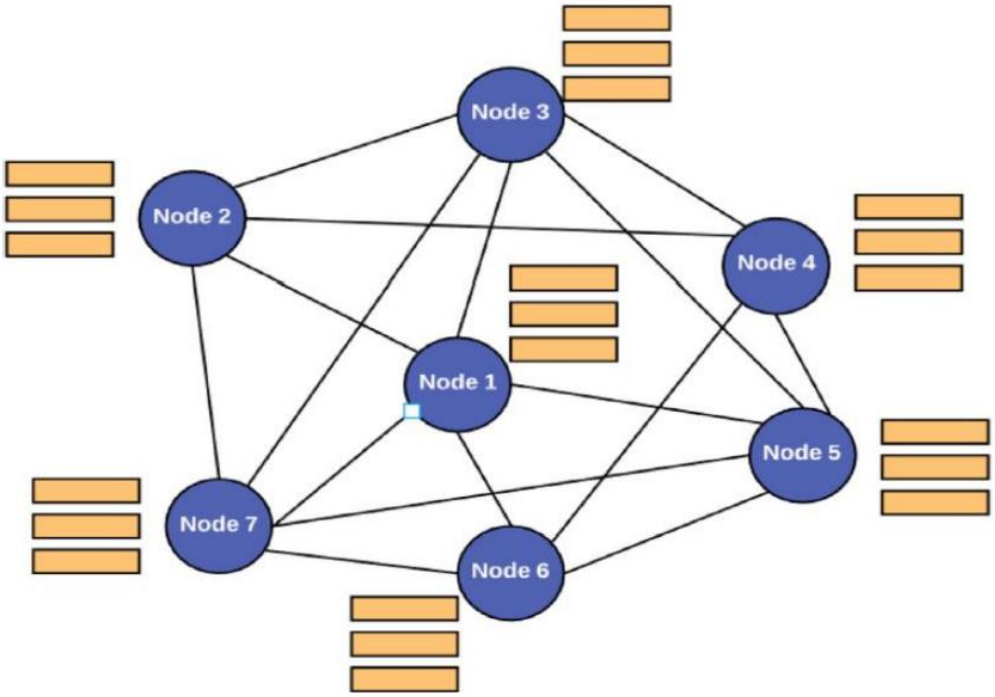

Figure 1 The blockchain architecture [3].

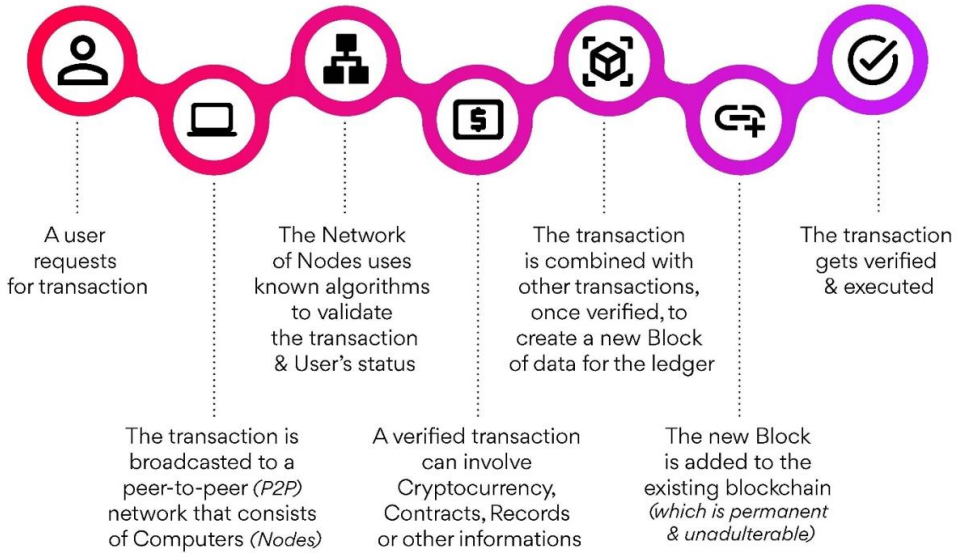

Figure 2 How the blockchain technology works [4].

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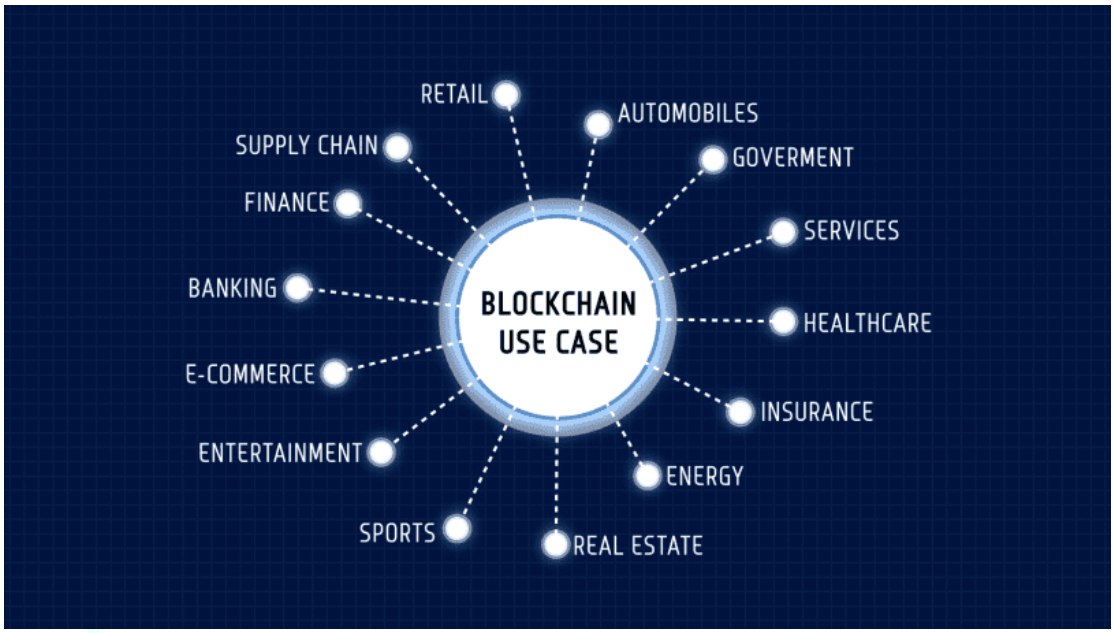

Figure 3 Different uses of blockchain [6].

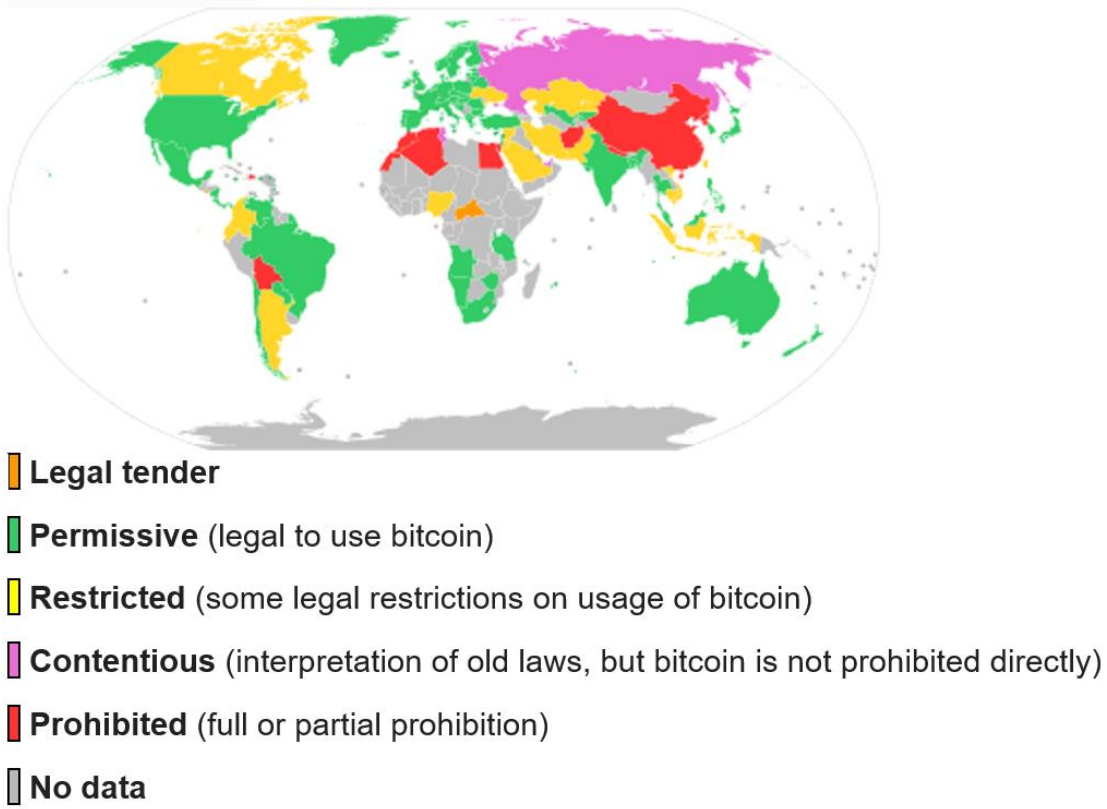

Figure 4 The legal status of bitcoin worldwide [9].

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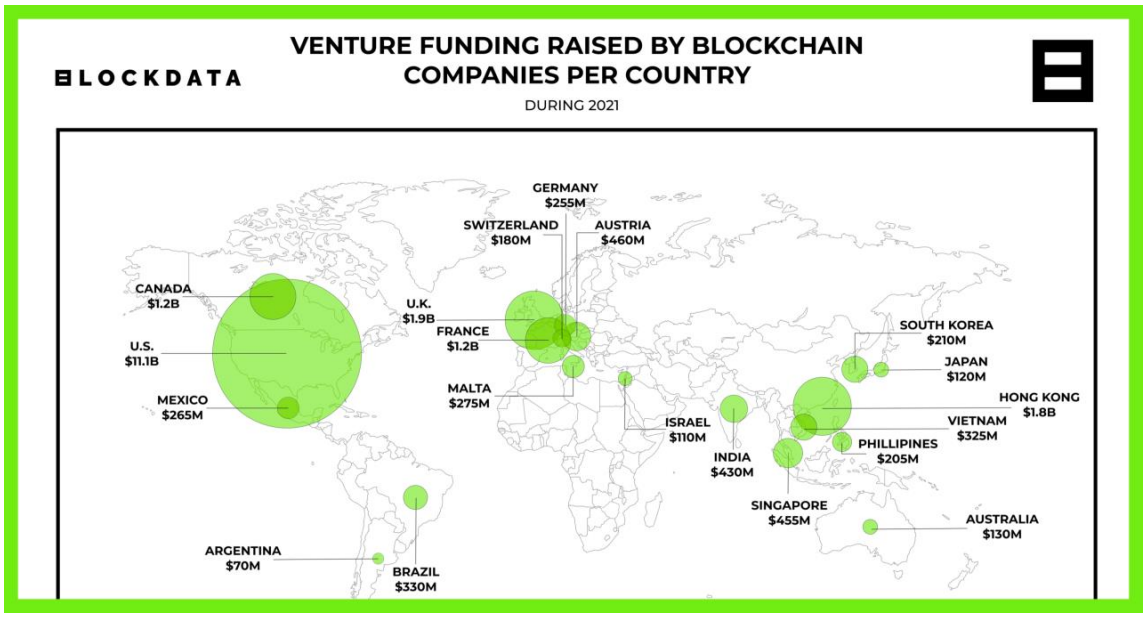

Figure 5 The venture funding raised by blockchain [10].