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Blockchain-Based Decentralization: A Review of Bitcoin's Currency Model

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***Abstract*— The latest digital trends in financial era of the world are the origination and enactment of cryptocurrency at global level, and even though neither accounting professions nor legal provisions have acknowledged it. This detailed article explores the study on Bitcoin a decentralized peer-to-peer way of electronic cash online transaction without involving any third-party financial intermediary, this paper suggests that by analyzing the past and present of Bitcoin, it can estimate Bitcoin's further potential. This paper throws light on understanding Bitcoin, its emergence, network of Bitcoin and how does it function. It defines the features and anonymity of bitcoin and its widespread uses. It also describes the benefits and risks related to bitcoin and the impact it is generating from the economic and financial point of view.**

Keywords—Bitcoin, Decentralized, Blockchain technology, Cryptocurrency, Peer-to-Peer(P2P).

I. INTRODUCTION

Bitcoin is a decentralized cryptocurrency (or digital money) established on the "peer-to-peer" networking plan (Nakamoto 2008). This ingenious revolution is attributed to "Satoshi Nakamoto," a pseudonymous computer programmer, developer or hacker ". The foremost objective was to build a transaction system that will not be influenced by any financial or administrative authority and was in accordance with a statistical model rather than "third-party trust." "Money transactions may be made digitally in a secure, conclusive, and irreversible manner. Implementation of Bitcoin concept entails a transactional system in which all transfer of funds occurs across a Peer-to-peer system and therefore are transmitted straight among the sender and the recipient. Regardless of the fact that the info is public, the person's identity remains incognito. Mining of Bitcoin is executed to accumulate data in the configuration of "blocks," and every block consists of the information pertaining to the present transaction and the preceding block. This connects each ongoing block with the initial block. The Proof-of-Work method confirms every one of the block's accounting entries. It is practically unfeasible to alter the Bitcoin programming without the provision that the vast members of the community are in agreement. To change this arrangement, a computer programmer or a hacker with malevolent intent needs massive computing potential [1].

Since its emergence in 2009, cryptocurrency, or digital money, notably Bitcoin, has been widely covered in business and technological headlines. The Bitcoin hunt has been compared to the California gold rush of the 1800s (Mathew, 2014). Mining is a method identical to the gold rush in that it involves computer processing power to solve "digital riddles" rather than bucket and shovels. During a late-2013 spike, the value of a Bitcoin hit an all-time maximum of $1,250, prompting many to race to mine Bitcoins. If Bitcoin is akin to California gold the digital currency's value should rise when its potential is fulfilled. Bitcoin use, research, and legislation continue to be in their initial phases. Further Bitcoin study is required to comprehend why Bitcoin and similar cryptocurrencies have not been broadly accepted, to fix current technological issues, and to enhance their acceptance. This study will help businesses with Bitcoin acceptance and strategic planning [2].

There are several advantages to using digital currency. For example, funds may be moved globally with no or extremely cheap fee charges and in record speed. Regrettably, Bitcoin has received unfavorable press due to price fluctuations, legal recognition, and hacking assaults. Yet, many expect that digital currencies will ultimately eclipse traditional currencies such as the US dollars and the UK Euros. According to an HP survey, 80% of the 634 IT employees polled anticipate digital currency to become the major payment technique in the coming years (Hajdarbegovic, 2014). Despite modest company acceptance, IT professionals currently believe this technology and have great hopes for its future supremacy. As a beginning point for understanding how Bitcoin might evolve, this article quickly defines

Bitcoins and highlights research in Bitcoin Technology [2]. This paper also describes the features, anonymity, benefits and risks and widespread uses of Bitcoin with its impact on our society.
In order to understand the concept of bitcoin, first we need to explore the terms and basic core concept of Bitcoin.

A. Blockchain Technology

Blockchain is a way of preserving information that renders it non-viable or tough to update, hacked, or exploit the system. A blockchain is a widely disseminated ledger that stores and distribute transactions all over the Blockchain's web of computers. Blockchain innovation is a system that keeps up with public value-based data, otherwise called blocks, in numerous data sets associated by shared hubs in an organization. This kind of stockpiling is some of the time called as a 'digital ledger.' Every exchange in this record is endorsed by the proprietor's advanced mark, which checks the exchange and keeps it from being messed with. As a result, the information contained in the digital ledger is extremely safe [8].

B. Cryptocurrency

In its most basic form, cryptocurrency is a peer-to-peer type of digital money. It enables internet payments to be transmitted directly from one entity to another without the need for a financial intermediary to be involved. Transactions are timestamped on the network using cryptography proof of work. The proof-of-work Bitcoin protocol is essentially a decoding contest with an inducement to rewarding individuals who participate. When it comes to Bitcoin, the first person to break the code will be awarded with newly generated coins. This competition will provide a history of transactions which can't be modified without repeating the proof of work [4].

C. Mining

Bitcoin is planned with a hard restriction of 21 million bitcoins, which are supposed to be mined by 2140 (Figure 1.1). Mining is a computationally demanding process in which miners must solve a specified mathematical challenge in order to generate an additional block. This is the logical proof of work. Mining is tough because, in addition to checking that transactions are genuine, miners must integrate the data in a specific manner so as to add it into the blockchain. Miners must predict and seek for a data sequence that produces the desired design. The problem's complexity is automatically altered such that a new block is able to be constructed every 10 minutes on average. The Bitcoin protocol was developed to gradually create new bitcoins at a predictable but diminishing pace [4].

II. UNDERSTANDING BITCOIN AND ITS CONCEPT

Satoshi Nakamoto launched Bitcoin as open-source software in 2009, following the online publishing of a document by Satoshi Nakamoto detailing the evidence of concept for a currency that use cryptography to control its formation and transactions instead of trusting in a centralized power (Nakamoto, 2008) [4]. Software that is open-source is offered for free with few restrictions because Bitcoin is not regulated by a political entity like a typical fiat money system [2], Fiat money is a financial unit that is supported by a central authority and is utilized as a medium of exchange, whose worth is determined by supply and demand, in addition to trust in the central authority [5]. Nakamoto envisioned Bitcoin as "the people's currency," freely accessible to be utilized by all residents of the globe. Nakamoto's vision, on the other hand, is yet to emerge. Despite greater buzz and booming industry interests, numerous issues continue to stymie wider corporate use [2].

Nakamoto deserted the project in 2010, and his true identity is still undisclosed. But, since the Bitcoin program protocol is open-source, additional different developers have continued to work on it and the Bitcoin's group of people thrives in present time [4]. In the mean-time time, while Satoshi Nakamoto stays unidentified, clients don't need to be stressed that him, or anyone else, surreptitiously controls Bitcoin. Because Bitcoin is open-source, the source code is publicly revealed. This revelation permits any software designer to review the protocol and generate their own copies of the program to carry out trials or for future expansion, and no warnings have been aroused as to the existence of Nakamoto or another entity with secret control thus far. Additionally, Bitcoin is intended to function only with full network consensus. This guarantees that computer programmers who alter the Bitcoin source code to create their own version of the program cannot impose a malicious modification in the Bitcoin protocol without affecting network compatibility. The ability to update the Bitcoin protocol necessitates unanimous agreement between Bitcoin developers as well as users [4].

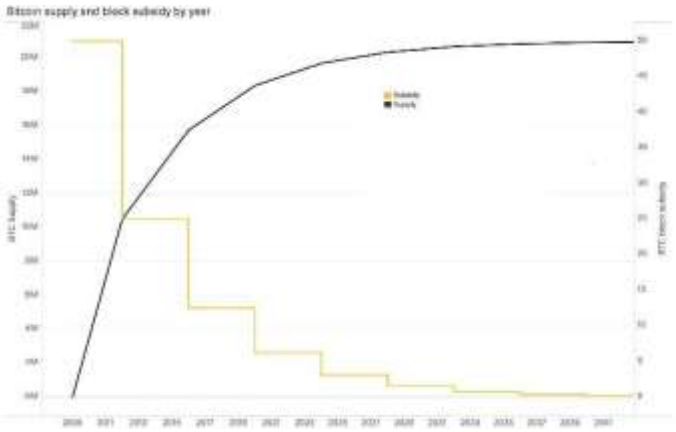

Figure. 1.1 Bitcoin Supply

Bitcoin is a decentralized (Figure 2.1) cryptocurrency, which is a type of digital currency. Although there are various types of cryptocurrencies, Bitcoin is the one that is most well-known, frequently utilized, and debated. The Bitcoin framework relies on a peer-to-peer network that is decentralized. Users can directly pay other users.

Cryptography is used to facilitate secure transactions. A user creates a digital sign by signing their transactions with a private key. This confirms the transaction's legitimacy. After a transaction is verified, it is added to the "blockchain," which is a record that contains all transactions in the Bitcoin network. The payment is then processed through the "mining" procedure. Individual users supply processing resources to run a sophisticated block hash code to verify transactions; in exchange, they earn Bitcoins.
Lastly, the transaction value is put in the wallet address of the recipient (Hobson, 2013) [2].

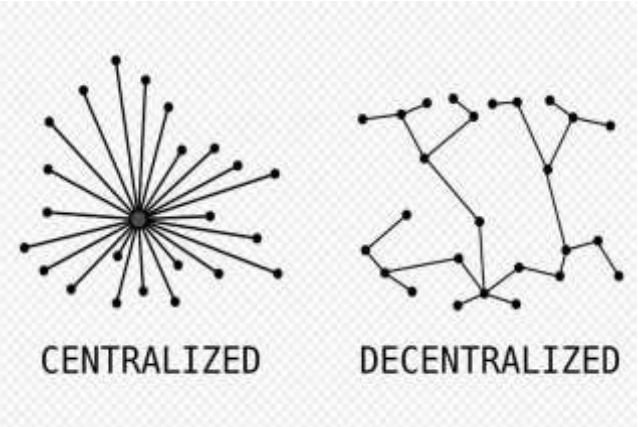

Figure 2.1 Centralized & Decentralized

A. Double Spending Issue

Traditionally, financial institutions such as banks or credit card firms have handled digital payment systems, preventing double spending. The risk of somebody mishandling the straightforwardness deficiency in web-based exchanges to spend the asset they don't have is known as double spending. In exchange for preventing duplicate spending, financial intermediaries typically receive a share of the transactions they handle. This sense of security arises from the mediators' capacity to prevent duplicate spending by validating parties engaged in transactions (for example, purchaser and dealer) and keeping a record of all activities.[5]

B. Emergence of Bitcoin

In the year of 2008, an unidentified software developer utilizing the pseudonym Nakamoto delivered the Bitcoin proposition in his article named Bitcoin a peer-to-peer electronic cash system. In year 2009, Bitcoin was primarily utilized after it was delivered as open-source programming, when Satoshi mined the beginning block of the blockchain. This is alluded to as the ‘Genesis block’ and it accommodated the initial 50 Bitcoins at any point made. From that point on, Bitcoin kept on being mined by various initial supporter until 2010 [7]. The objective of his article was to lay out a framework that disposed of the issue of twofold spending without the necessity for a concentrated power like the United States administration or commercial foundations. The system was named Bitcoin, as well as the cryptocurrency was abbreviated as Bitcoin. To execute transactions, Nakamoto envisaged that Bitcoin needs technologically proficient people (miners) instead of centralized authority. Efforts to deceive this user group would result in transaction rejection. This architecture said to be decentralized, because no governing bodies holds authority to impose charges or restrict transactional movement. In general, transacting online, even globally, would be simpler, cheaper, and quicker.[5]

C. Network of Bitcoin

The Bitcoin framework is built on a shared organization (P2P networking) that is decentralized. It isn't just decentralized yet in addition obviously completely conveyed. That is, every hub or computing station is connected with the others. Any node can quit and return the network at any moment, and the extensive proof of work, also called blockchain, will subsequently be accepted as the official record. This prolonged blockchain demonstrates what occurred when these nodes were unavailable.

Bitcoin networking is a peer-to-peer(P2P) organization of hubs that utilization the Bitcoin convention to impart. The actual framework provides a publicly accessible, decentralized ledger. The nodes ensure that every ledger modification adheres to the Bitcoin protocol's regulations. With Bitcoin cryptocurrency wallet software, users send cryptographically marked messages to the organization. These messages include proposed transactions, or modifications to the record. Every hub has a full record of the record's exchange history. In the event that an exchange penetrates the Bitcoin convention's guidelines, it is disregarded.

Transactions happen just when the whole organization consents to them. This "complete network consensus" is gotten when each organization hub affirms the results of a proof-of-work process known as mining. Mining sorts out assortments of exchanges into blocks and produces a hash code that complies with the Bitcoin convention's guidelines. This hash needs costly energy to create, yet an organization hub might check its legitimacy with somewhat little energy. In the event that an miner offers a block to the organization and its hash is correct, the block and its record refreshes are remembered for the blockchain, and hence the organization continues to the handling exchanges. In case of a conflict, the lengthiest chain is judged to be right. To distribute transactions, the network requires very little structure. Having a decentralized organization of volunteers is adequate. Messages are broadcasted using greatest efforts, and nodes can quit & reenter the network at any time. As a node reconnects, it acquires and approves new blocks from those different hubs to refresh its nearby blockchain duplicate [6].

D. Working mechanism of Bitcoin

The three vital components of Bitcoin are users, miners, and the blockchain and each one of them work together to manage exchanges [5]. The Block-chain is a worldwide add just record that records all bitcoin exchanges since its beginning in 2009 [3]. Users transmit funds by providing instructions to

the Bitcoin organization, where the connected exchange is disseminated to excavators(miner), in order to move money. Instead of adding transactions in a continuous stream, the blockchain adds them at predetermined intervals. To do this, it gathers all new system transactions, compiles them into blocks, and then adds the block to the top of the blockchain. Users and their transactions are verified by miners by using their computing capacity to solve challenging mathematical problems. The processing power contribution of the miners then updates the Block-Chain with that transaction. At the point when a block including a specific exchange is added to the blockchain, that exchange is viewed as affirmed [5].

Blocks are information entities that principally hold an assortment of exchanges that have happened in the framework (Figure 2.2). To achieve the add just trait, acquainting a block with the blockchain is a troublesome test, consequently adding blocks to a dispersed record takes time and exertion. Furthermore, each block is filed utilizing its hash esteem, and each recent block accommodate the previous block's hash esteem (Figure 2.2). Such a strategy guarantees that changing a block amidst the chain suggests changing all resulting blocks in the chain after that spot to the top in a way that matches all cryptographic hash.

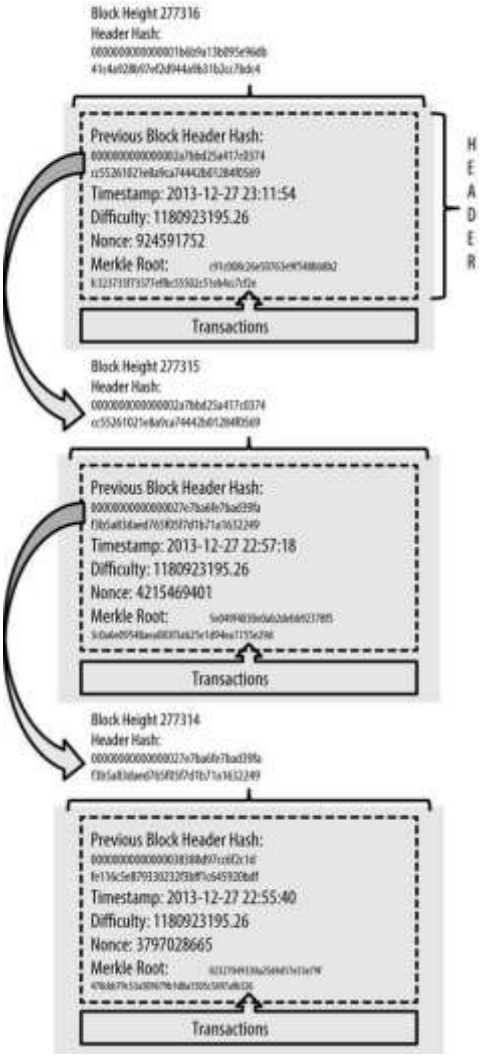

Figure 2.2 Blocks linked in a chain, by reference to the previous block header hash

The act of contributing a new block to the blockchain is referred as mining process, which is decentralized and might be done by any individual from the bitcoin community utilizing particular programming (and equipment). The hash proof-of-work scheme, at first created by Adam Back as an enemy of spam measure, is utilized in the mining system. Getting a hash of the recently developed block that is less than a predetermined value is the proof-of-work. Until the required value is attained, this procedure is carried out by sheer force changing the block's nonce value and hashing the block. The recently added block turns into the top block of the blockchain after the value has been determined, at which point all miners dismiss the work they had done on the previous block and go on to the succeeding one, assembling new exchanges and involving the hash of the top block as the past block hash [3].

Mining fresh blocks is a crucial obligation in the bitcoin network since it helps to approve framework exchanges. Subsequently, and assuming that mining includes difficult work, miners should be sufficiently paid; consequently, miners create and get Bitcoin as a compensation for their contribution. Miners in the bitcoin network are repaid through two different ways. The underlying one gives them brand new minted bitcoins. Each new block contains a unique exchange called 'generation transaction', where no input address shows up and the output address is concluded by the miner who makes the block, who evidently assigns one of its own addresses. The second impetus strategy is the expense that every exchange pays to the miner. The charge for each exchange is computed by subtracting the entire input amount from the overall output amount of the transaction. The generation transaction remembers all charges procured from exchanges for a block [3].

Bitcoin eliminates issue of double spending by keeping an equilibrium record, however rather than relying upon a particular outsider to deal with that record, Bitcoin decentralizes this undertaking to the entire organization. In background, the Bitcoin network maintains a public database of bitcoin balances known as the block chain. The blockchain is an openly accessible authority record of all exchanges at any point executed, permitting anyone to utilize Bitcoin programming to validate a transaction's legitimacy. Transfer of bitcoins, or transaction, are broadcasted to the whole community and recorded on the blockchain after successful authentication, ensuring that spent bitcoins can't be used once more. New exchanges are checked on the blockchain to guarantee that the bitcoins haven't recently been spent, consequently preventing issue of double-spending.

E. Features of Bitcoin Technology

The following are the major features for an effective decentralized cryptocurrency:

1) Peer-to-peer: Distributed (P2P) innovation depends on the decentralization idea, which lets network members manage exchanges without requiring any mediator, administrative or financial authority.

2) Decentralized: task of an association, especially those in regards to thinking and managing, are dispersed or designated away from a focal, legitimate sections or class and given to more modest groups inside it.

3) Open-source programme: programming that is conveyed with its source code, making it accessible for use, change, and circulation with its unique freedoms.

4) Secure: Bitcoin produces a design of information with intrinsic security characteristics. It depends on standards of cryptography, decentralization and agreement, which guarantee trust in information and fund transfer.

5) Fast: The transaction speed is very fast.

6) Reliability: There is no risk of settlement, and it is not reversible

7) Sophisticated and flexible: The system is capable of supporting various forms of assets, financial tools, and markets.

8) Global: Bitcoin is a legal tender all around the world, which is an excellent and feasible aspect for financial integration among the parties with or without smart contracts.

9) Scalable: The framework can be utilized by a huge number of participants.

F. Anonymity Feature of Bitcoin

Anonymity is doubtlessly perhaps the best quality that has added to the bitcoin's prosperity. Secrecy on the bitcoin network is established on the thought that clients can produce a limitless number of anonymized Bitcoin addresses for use in bitcoin exchanges. This principal approach is a excellent start, however the underlying non-unknown Organization foundation, alongside the accessibility of all bitcoin exchanges in the blockchain, has demonstrated to be a threat to obscurity [3].

G. Practical use of Bitcoin

Bitcoin is generally used as a form of payment. After mined, it is traded to a Bitcoin Cryptocurrency exchange like Binance, which subsequently resells Bitcoin to customers at market cost. Customers thereafter deposit their bought bitcoin in a personal crypto wallet to make them more accessible. It may be used to buy a range of products that fiat or currency cannot. The market price is determined by investor's faith in the Bitcoin and the fundamental architecture, that precludes illegitimate alterations in the block-chain. It lacks any intrinsic worth because no organization, institution or administrative authority backs it. Instead, it's worth stems from its use as an alternate fiat money. Because of the high level of fluctuation that bitcoin has seen, speculative uses too are common. Most exchanges have profited from this, especially when bitcoin becomes particularly volatile.[5]

III. BENEFITS AND RISKS FACTORS

A. Benefits of Bitcoin

1) Accessibility and Liquidity: One huge benefit of Bitcoin is that it is an entirely reachable and versatile currency. Since it basically requires a couple of moments to send bitcoins from one user to a another user, it very well might be utilized to purchase items and resources from the consistently developing number of organizations who acknowledge it. [9].

2) User Anonymity and Transparency: In spite of the fact that Bitcoin clients are not completely mysterious, they are perceived by mathematical codes and can have various public keys. This obstructs public observing and permits transactions to be followed back to the client [9].

3) Independence From Central Control: Bitcoin is a decentralized money, and it implies that it isn't represented by any one national bank or administrative body. This suggests that officials are probably not going to confiscate and take your coins. Along these lines, there is no attainable structure for Bitcoin to be introduced with taxation policy [9].

4) High Return Potential: Bitcoin is a promising world currency that has attracted the attention of many investors and businesses. This contributes to the increased return potential [9].

B. Risks of Bitcoin

1) Volatility: Since there is a constraint of 21 million bitcoins that may at any point exist, some believe Bitcoin to be incredibly scarce. This shortage makes Bitcoin significant, however it likewise makes its price to vary, since the cost has turned into the main variable that can adjust to guarantee the demand and supply [9].

2) Lack of Government Regulations: Bitcoin transactions lacks constitutional immunity and are frequently irrevocable, which makes them more susceptible to scam than a currency controlled by a centralized authority [9].

3) Irreversible: One more disadvantage of Bitcoin exchanges is their absence of safety since they are incognito and uncontrolled. There is no hope in the event that some unacceptable sum or beneficiary is moved since exchanges made utilizing Bitcoin are irrevocable and absolute [9].

4) Limited Use: Even though more businesses are accepting Bitcoin, it is still not generally recognised. The region you can make purchases are obliged by this, rather than when you utilize a credit or check card [9].

C. *Involvement with criminal conduct*

Considering Bitcoin's anonymity and simplicity of transaction, it's really no surprise that authorities are worried about its usage in assisting illegal behavior. Indeed, quite possibly of the most prominent illegal applications of Bitcoin was on the Silk Road website, a black market where illegal narcotics and fraudulent passports were often traded. Silk Road created a platform for such kind of illegal products and services by combining Bitcoin transactions as well as the anonymous online network (Chen, 2011). A further big fear about Bitcoin is that it is being used to launder funds and support terrorist operations. These fears were heightened after the Liberty Reserve, a privatized and centralized virtual currency, was closed down in response to money laundering issues (BBC News, 2013). It is basic to understand, however, that bitcoins are like cash, and assets can be utilized for both legitimate and unlawful reasons.

Before Bitcoin, other types of financial transmission were also used to finance criminal activities and launder the funds. However, several Bitcoin exchanges are starting to implement anti- money laundry measures, such as storing customer information, that will diminish the appeal of Bitcoin to criminals [4].

IV. Impact of Bitcoin revolution

The introduction of bitcoin as an alternative to the conventional economic institutions has resulted in a significant impact on civilization. It is now possible to make purchases of products and facilities without utilizing government issued currency. Bitcoin is the only thing needed to get initiated. Additionally, you won't have to worry about intermediates. You don't have to go by means of the financial foundation to move assets to your staff. Overall, the adoption and appreciation of technology's role in facilitating paperless transactions has been encouraged by Bitcoin. In the digital era we live in, Bitcoin opens up new possibilities for us to perceive and take advantage of [10]. Although bitcoin will not displace fiat money, its blockchain technology will undoubtedly have an influence on people's well-being and could bring out inequalities.

Secondly, use of smart contracts for a collaborative economy has been made possible by blockchain. We can pool our resources, such as automobiles, hard disk drives, and computing device, and lease them to other people at a charge. All of this is achievable in the by the assistance of smart contracts and the distributed peer-to-peer network. This guarantees that resources are not required to be expanded, but that additional resource is utilized efficiently [4].

V. Literature review

In order to assess the elaborate description of Bitcoin, we performed a detailed literature review. This literature research focuses on the origin of Bitcoin, its network and how does it function, we described the complete functionality of Bitcoin, its features as well as the benefits and risks related with use of Bitcoin.

This article can be summarized by saying, Bitcoin is a Decentralized peer-to-peer network based open-source program which is capable of solving the problem of double spending. The transaction of Bitcoin is verified by Proof of work principle in which no third party or central authority is required for its working. As every coin has two sides, Bitcoin too does have its own merits and demerits. It can be used in both legal and illegal aspects, it depends on its user how they utilize it. Bitcoin is making an huge impact on society as it is promoting decentralization and transparency in the transaction system which has led to the increased trust in it. However, its volatility and utilization in illegalized criminal activities have also prompted concerns about its long-term sustainability and potential negative consequences.

VI. Suggestions for Future Research

This paper suggests that future research on Bitcoin should consider the study on how researchers can implement this on growing technology to banking and government sectors and how it can solve the real-life problems related to the society's day to day functioning. It also recommends researchers to look into how Bitcoin might change the way the world's financial system operates. Also, one potential area of research on Bitcoin can be its environmental impact as the energy consumption associated with mining is increasing with growing popularity of Bitcoin.

Conclusion

Bitcoin is an innovative concept which has bring a revolution in terms of decentralized peer-to-peer network transactions. It has provided the most urgent security and transparency in fund transfer process by adopting the method of cryptography. Also, with the help of Blockchain technology we can keep the records of all the transactions happening in Bitcoin which is eliminating the issue of double spending with ease. Bitcoin has been envisioned as "the people's currency" by its introducer which is indeed a people's currency as there is no control of any central authority and government body over it, there is only the community of people which is solely responsible for its functioning. Bitcoin has its own pros and cons, the only question that will make the difference is how we going to use it and for what. Bitcoin has the potential of solving various problems faced by society in different aspects of their life. But it is possible only when people understand the growing technology of Bitcoin in further detail and by conducting multiple researches on it as well as on Blockchain Technology.

By analyzing the approach of Bitcoin, this article can firmly conclude that Bitcoin and Blockchain technology is here to stay and evolve with time. It is just a matter of time and trust when these innovative and evolving technologies will be implemented in multiple sectors and industries of our ever-growing world.

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Figure.1.1
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Figure.2.1
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Figure 2.2
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