VOL. 09 NO. 9,
AUGUST, 2025
E-ISSN 3026-958X
P-ISSN 3027-1169

African Scholar Publications & Research International
www.africanscholarpub.com

Journal of Science Innovation & Technology Research (JSITR)

Emerging Innovation in Blockchain Technology and Cryptocurrency and their Implications for Sustainable Development in Nigeria

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DOI: https://doi.org/10.70382/ajsitr.v9i9.042

Abstract

It is impossible to overstate the importance of blockchain technology in the cryptocurrency space. In the field of Information and Communication Technologies, the two technologies are relatively new (ICT). The cryptocurrency Bitcoin has drawn a lot of attention as one of its first applications. Blockchain Technology was created to enable direct payments or transactions between two parties over the Internet. In this case, the blockchain was acting as the primary ledger for recording Bitcoin transfers and securing the authentication and non-repudiation of payments through cryptographic operations. Governmental and non-governmental organizations have since researched this technology and applied it to a variety of fields, including smart contracts, finance and commerce, copyright and intellectual property, real estate, digital identities, healthcare, and others. This paper provides a brief introduction to blockchain technology and cryptocurrencies and identifies applications for blockchain technology in developing nations like Nigeria in order to promote sustainable development. It is therefore recommend that to empower young people, the government should take advantage of cryptocurrency technology.

Keyword*:* Emerging Innovation, Blockchain Technology, Cryptocurrency, Bitcoin, Sustainable Development.

Introduction

Blockchain and cryptocurrency technology are components of Information and Communication Technology (ICT), which has permeated almost all public and private organizations in developed countries. Blockchain is the foundation of all cryptocurrency transactions and exchanges. As the name implies, a "blockchain" is a collection of transactions or activities that are chained together in blocks of a specific size or capacity of 1MB. When a block's size limit, usually 4MB, is reached, programmers add another block by solving complex mathematical puzzles for incoming transactions.

Cryptocurrencies were the first to use Blockchain Technology to create money without the use of central banks and to facilitate payments without the use of financial institutions (Worldbank, 2021). In the case of cryptocurrency, specifically Bitcoin, a programmer referred to as a "Miner" adds individual blocks to the blockchain by solving complex mathematical problems or puzzles. This procedure necessitates both computational and electrical power. The mining is not done by a single computer (miner) the process involves many miners from diverse geographical location who competes to add each block to the chain, hence the term Blockchain. Any Miner who solves the problem earns the opportunity to add the block along with an approved transaction and broadcast the new block to the network, allowing all participants to update the Blockchain in their own copy.

Jimoh et al., (2021), claim that Blockchain is a distributed ledger that maintains an audit-proof record of all transactions across a network of interconnected systems. Jimoh et al., (2021), added that a blockchain creates a mathematically irrefutable history by grouping transactions into blocks and cryptographically chaining them in an approach that is irreversible. Peer-to-peer networks, Merkle trees, asymmetric key encryption, and hash values, to name a few, are what power blockchain, allowing data to be stored across multiple locations while still being constantly reconciled via a common database.

Blockchain technology is one of the developing technologies that eNigeria's annual International Summit on ICT in 2018 highlights as one whose adoption would boast sustainable ICT development in Nigeria. Adoption of this fantastic emerging technological innovation in Nigeria will undoubtedly lead to economic transformation and sustainable development. Many young people have already embraced cryptocurrency and the Blockchain Technology that underpins it; this has also freed many of them from financial hardship. Numerous people have taken part in cryptocurrency trading and mining (Jimoh et al., 2021).

AN OVERVIEW OF BLOCKCHAIN TECHNOLOGY AND CRYPTOCURRENCY

There is no need for a centralized authority or computer because peer-to-peer networks are used by blockchain technology and cryptocurrencies. All cryptocurrencies, including Bitcoin, Etherium, Litecoin, Ripple, etc, are built on blockchain

technology. The concept of Blockchain Technology and cryptocurrency is unquestionably a brilliant invention. Satoshi Nakamoto, or a group of people going by that name, came up with the idea, and it has since grown into something greater. Blockchain is a distributed, decentralized public ledger, claims Emmanuel (Gatteschi et al., 2018). Blockchain is a general term for a chain of digital data blocks ("the block") kept in a public database ("the chain"). According to Gatteschi et al. (2018), some of the fundamental ideas underlying cryptocurrency and blockchain technology include the following:

i. **Transactions -** A transaction from A to B is what is used to represent every cryptocurrency transfer between two subjects. The blockchain records every transaction that has taken place since it was created for this reason.
ii. **Blocks** - Blocks are collections of transactions. Every block gathers all the transactions that took place during a specific time period and maintains a link to the block before it (hence the term "chain").
iii. **Nodes -** The blockchain is distributed across network computers (the "nodes"), each of which has a local copy of the entire blockchain. This is different from being stored in a single database.
iv. **Majority consensus -** Because there is no central authority, decisions on the network are made by a majority of users.
v. **Mining -** During the "mining" process, one could either actively contribute to the maintenance of the blockchain or passively store a copy of the blockchain. When a block needs to be added to the chain, nodes must solve a challenging computational-mathematical problem each time. During mining, nodes check previous transactions to determine whether a subject is authorized to spend a certain amount of cryptocurrency. This issue was created specifically to reduce the chance that a malicious party could trick the blockchain by fabricating transactions.
vi. **Wallet:** People use wallets to transfer cryptocurrencies. Cryptocurrency is the outcome of previous transactions; it cannot be physically stored in a memory. Because of this, the wallet only keeps the credentials—a difficult-to-forget combination of randomly generated numbers and letters—that let blockchain users transfer the cryptocurrencies they own. Each wallet has a unique address or address associated with it. A user would need to specify the recipient's address, and the desired amount, and use their credentials to validate the transaction if they wanted to send a peer a certain amount of cryptocurrency.

Because the records are kept by a decentralized system, cryptocurrency is a form of digital currency in which every transaction is carried out online and verified without any physical exchange. It is a means of exchanging value like any other legal tender, including NGN, USD, EUR, etc., but differs from standard money in that it was created to exchange digital information using a technique called cryptography. Blockchain technology is used by cryptocurrencies to increase decentralization, transparency, and immutability. However, cryptocurrencies have sparked a lot of debate. These virtual currencies are criticized as being

a bubble, a scam, and even evil (Krugman, 2013; Popper, 2018). Cryptocurrencies, according to proponents, will eventually replace money (Rooney, 2018).

Satoshi Nakamoto created Bitcoin, the first and most well-known cryptocurrency in January 2008 (Deja et al, 2018). There were 4, 501 cryptocurrencies that were categorized as tokens or coins as of February 2021 (Raynor, 2021), and as of March 6, 2021, their market capitalization was $1, 564, 134, 392, 350 [10]. the term "Altcoin" or "Alternate Coin" refers to all cryptocurrencies other than Bitcoin.

PROPERTIES OF BLOCKCHAIN TECHNOLOGY AND CRYPTOCURRENCY

Iredale, (2020), claims that blockchain technology offers a lot more than just a network for cryptocurrencies. The following characteristics of cryptocurrency and blockchain technology include:

i. **Immutability** refers to the inability to be altered or changed. This is one of the key characteristics of blockchain technology that ensures the network will always exist and cannot be changed. The way that blockchain technology operates differs a little from traditional banking systems. A network of nodes is used to guarantee the blockchain's features rather than relying on centralized authorities. A copy of the digital ledger is stored on each node in the system. Every node must verify a transaction's validity before adding it. If the majority agrees that it is legitimate, it is recorded in the ledger. This encourages transparency and makes it impervious to corruption. The fact that no one can simply go back and change a transaction block once it has been added to the ledger supports the list of essential blockchain features. As a result, it will be protected from editing, deleting, or updating by any network user.

ii. **Decentralized -** Because the network is decentralized, no one person or governing body is in charge of running it. Because numerous nodes are responsible for maintaining the network, it is decentralized. Because the system doesn't require a governing body, we can access it directly from the web and store our assets there. Anything can be stored, including contracts, significant papers, priceless digital assets, and cryptocurrencies. You will have full control over them using the blockchain and your private key. As a result, the decentralized structure is giving the common people back control over their assets and their rights.

iii. **Hashing is Irreversible -** Because hashing is so intricate, it cannot be changed or reversed. A public key cannot be used to generate a private key. Small changes are not a luxury in the system because they could result in a completely different ID with just one change in the input. There could be countless millions of people, and every one of them would have a duplicate of the ledger. Millions of computers are virtually impossible to access and expensive to hack.

iv. Consensus - The consensus algorithms are what make every blockchain successful. Consensus algorithms are at the heart of this architecture, which is cleverly designed. Every blockchain has a consensus mechanism to aid in network decision-making.

Simply put, the consensus is a method of decision-making for the group of active nodes on the network. For a system to function properly when millions of nodes are validating a transaction, a consensus is unavoidably required. It could be compared to a voting process where the majority wins and the minority is required to support it.

v. **Quicker Settlement -** In comparison to transactions made using blockchain technology, traditional banking systems are incredibly slow. After all, settlements have been completed, it can occasionally take days to process a transaction. In this way, a user can transfer money somewhat more quickly, which ultimately saves a lot of time. Despite the distance between sender and receiver, cryptocurrency transactions on the Blockchain network take place almost instantly and are confirmed within a few minutes.

BLOCKCHAIN TECHNOLOGY AND CRYPTOCURRENCY FOR SUSTAINABLE DEVELOPMENT IN NIGERIA

Normal people are empowered by blockchain technology and cryptocurrencies because no centralized authority is needed to conduct transactions. Since the transactions take place in a P2P (peer-to-peer) network, a third party is not involved. Through activities such as mining, acting as a cryptocurrency merchant, trading, staking, and working on cryptocurrency projects, among others, people can become economically more powerful.

Blockchain technology has grown in popularity over the past few years, according to Sharma (2020). It would be accurate to say that Blockchain technology is undoubtedly an alternative to the Internet. The following are some ways that blockchain technology can promote sustainable development, particularly in Nigeria:

i. **Supply chain management:** Blockchains allow for precise item location identification along the supply chain. Thus, it eliminates the requirement for paper-based trials. Given that it is stored in the block permanently, the quantity supplied could also be calculated.

ii. **Digital IDs** - In Nigeria, identity authentication and authorization are major concerns. The National Identification Number (NIN), Voters Registration Information (VRI), and Bank Verification Number (BVN) are just a few of the identity databases that are kept in various places across the nation. Nigerian unique identity and cyber digital identity issues can be resolved using blockchain technology, where identities can be created, authenticated, and updated in a unique, secure, and unrefutable way. Numerous economic sectors, including government digital development and promotion, cybersecurity, digital inclusion, healthcare, national security, banking, and e-commerce, would benefit from effective identity management.

iii. **Healthcare -** As the focal point of the healthcare ecosystem, the patient has a right to truthful information. Nigeria can seriously investigate this as well. It facilitates the tracking of prescription drug serial numbers and batch numbers. Our hospitals should stop using paper for record-keeping and start storing patient data digitally using blockchain technology. In order to maintain control over who can access these records,

the patient would be given a number key. In order to keep track of a patient's medical history, patient diagnoses can also be stored.

iv. **Food safety:** One fascinating application of blockchain in food safety is the ability to track your food from its farm to your plate. Food products can be transported from their place of origin to the supermarket using the immutable nature of blockchain. In the case of food-borne illnesses, the source of the contaminant can be traced quickly and accurately.

v. **Digital Voting Process -** In Nigeria, voting fraud has always been a major source of concern. It won't be with the adoption of Blockchain technology. With the immutable nature of the blockchain, you can ensure that your vote actually counts. It will make voting transparent, and regulators will be alerted to any network modifications.

vi. **Real estate:** The blockchain stores ownership and title information, making it simpler to transfer ownership and trace ownership. By taking paper out of the picture, it provides a clear picture of legal ownership.

Weapons tracking - The federal government and law enforcement would be able to track the ownership of weapons or guns with the adoption of Blockchain Technology. It will serve as a constant and open registry that will help to keep track of privately purchased weapons. This aids in addressing the security situation and, as a result, lowers the crime rate.

Financial Services - Government financial services, banks, and other financial institutions frequently struggle with the lack of a synchronized database to access identity confirmation, the availability of collateral, and the creditworthiness of individuals and small business owners, which makes it more difficult to access funds. Information about the financial standing of their clients, customers, and beneficiaries, including information about financial status, current loans, interest obligations, collaterals, repayment histories, and income levels, could be saved using an efficient ledger system like Blockchain Technology.

Corruption - Nigeria and all of Africa still have work to do to completely eradicate corruption (Sharma, 2020). Every year, corruption costs the African continent an average of 148 billion dollars or 25% of its average GDP (Mike, 2019). According to the 2021 Open Budget Index (OBI) survey, Nigeria was ranked 45th out of 100 in 120 countries in terms of budget transparency (Songwe, 2018). By making all government transactions open and transparent for system users to examine, the non-changeability of the Blockchain can be used to eliminate monopoly.

CONCLUSION

Nigeria needs to take advantage of blockchain and cryptocurrency to fully realize its benefits for sustainable development. Despite the waves the new technology is making, many Nigerians, especially the policymakers, are still hesitant to adopt blockchain technology and cryptocurrencies. When adopting and implementing blockchain, there are a number of restrictions to consider. For a developing nation like Nigeria, these restrictions include

conceptual issues, education and awareness, cost, and governance. Whatever the future holds, the organization of production and commerce in developed nations is changing as a result of a tidal wave of new technologies, including cryptocurrencies and Blockchain Technology. When this technology is used, Nigeria will develop greatly and sustainably.

RECOMMENDATION

Economic growth and sustainability are severely hampered by the Federal Government's recent policy that forbids cryptocurrency use and orders banks to stop supporting its users. To empower young people, the government should take advantage of cryptocurrency technology. A large number of young people are financially self-sufficient thanks to cryptocurrency technology; they take part in activities like mining and trading coins and tokens. Additionally, despite all of its benefits, cryptocurrency and blockchain technology are still relatively new developments in modern technology. The Federal Government of Nigeria could use blockchain to fight corruption in all facets of the country's economy:

- Blockchain technology, for instance, could be used to end corrupt budgetary practices. By integrating applications on Blockchain Technology that would keep track of all budget-related activities, including its creation and all transactions, and make it accessible to all network participants, budget-tracking mechanisms could be developed.
- Making all transaction information transparent for public inspection, including transaction cost, account information, receivers, and time, could reduce corruption and money theft. Thereby making it challenging to steal public funds.

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