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BLOCKCHAIN IN AFRICA

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Abstract:

African economies have been held back from their full potential, but the blockchain technology could help change that. Blockchain technology has been gaining a lot of attention from businesses, investors, and governments worldwide. It is having an influence on African lives, well-being, and resilience. It has come to be perceived as a groundbreaking method that can bypass the several systemic flaws affecting the continent. The increase in blockchain adoption demonstrates the rising confidence in the potential of blockchain technology to drive financial independence, infrastructure development, personal identification, and record-keeping in Africa. This paper examines the use or adoption of blockchain technology in Africa and its potential benefits for the region.

Keywords: *Africa, blockchain, blockchain in Africa, distributed ledger technology (DLT).*

INTRODUCTION

Africa is a continent that has 54 countries with an area of 30,370,000 square km and 1.4 billion individuals as of 2021, subdivided into five major regions, like Northern Africa (with countries like Libya, Egypt, North Sudan, Algeria, Morocco, and Tunisia as demonstrated) inhabiting the northerly region of Africa [1]. The continent is not just catching up with the world; it is propelling itself to the forefront of innovation. Africa is rising, and its tech scene is leading the way. Africa is closely watched as the next big growth market. It is the home to some of the youngest populations in the world and also to many fast-growing economies. Africa is a booming continent with incredible growth potential, as the second-largest continent in the world and the world's largest free trade area, connecting 1.3 billion people (16.6% of the world population) across 55 nations. The art and culture of Africa are diverse, reflecting the varied ethnic groups that inhabit the continent. Today's Africa is bogged down by insecurity, healthcare, corruption, lack of mechanized

farming, economic instability, underdevelopment, poverty, unemployment, corruption, nepotism, lingering effects of destructive colonialism, etc.

Contracts, transactions, and their records are critical, defining structures in our economic, legal, and political systems, but they have not being able to keep up with the world's digital transformation. Blockchain (BC) promises to solve this problem. Blockchain (also known as "distributed ledger technology") is a peer-to-peer network that sits on top of the Internet. It was introduced in 2008 as part of a proposal for Bitcoin. Bitcoin is the first application of BC technology. Bitcoin is a cryptographic electronic payment system that purports to be the world's first cryptocurrency. It has become the most talked about cryptocurrency. The software is completely open source so that any developer can download it, modify it, and create his own version of the software. This unique feature has led to an explosion of alternative bitcoin implementations, popularly known as altcoins. Some of the popular implementations include IxCoin, Namecoin, Litecoin, Ripple, Dogecoin, and Bitcoin. Some of the key benefits of Bitcoin include security, transparency, lower transaction costs, anonymity, and resilience. Although Bitcoin is a revolutionary idea, its implementation suffers some problems such as instability, deflation, lack of replicability, computational inefficiency, and lack of regulation or enforcement [2].

The blockchain could bring everything that is good about Bitcoin and translate it into decentralized applications. Blockchain refers to new applications of a distributed database technology that builds on a tamper-proof records of time-stamped transactions. By decentralizing it, blockchain makes data transparent to everyone involved and this eliminates the risks that come with data being held centrally. A blockchain facilitates secure online transactions [3].

In recent years, blockchain technologies have been finding practical applications across the African continent and accelerating Africa's transition to a single digital economy. The blockchain technology continues to impact Africa to a degree that is unprecedented anywhere else in the world. The African blockchain industry is understandably experiencing rapid growth, with investors readily embracing it. The transformative potential of this technology for business operations in Africa is undeniable. Nigeria is the leading country in terms of the number of blockchain startups funded, followed by South Africa, Seychelles, and Kenya [4].

WHAT IS BLOCKCHAIN?

Blockchain, a type of distributed digital ledger technology (DLT), is a relatively new and exciting way of recording transactions in the digital age. It is a decentralized and distributed digital ledger technology that securely records and verifies transactions across multiple computers or nodes in a network. Basically, it is a chain of blocks in which each block contains a list of transactions. The blockchain technology was created as the foundational basis for Bitcoin – a digital currency in which secure peer-to-peer transactions occur over the Internet. It is expected that the spending on blockchain solutions worldwide would grow from 4.5 billion USD (2020) to an estimated value of 19 billion USD by 2024 [5].

Originally developed as the accounting method for the virtual currency Bitcoin, blockchains are appearing in a variety of commercial applications today. Blockchain technology is a type of distributed digital ledger that uses encryption to make entries permanent and tamper-proof and can be programmed to record financial transactions. It is used for secure transfer of money, assets, and information via a computer network such as the Internet without requiring a third-party intermediary. It is now being adopted across financial and non-financial sectors. As a catalyst for change, the Blockchain technology is going to change the business world and financial matters in major ways.

The first blockchain was conceived in 2008 by an anonymous person or group known as Satoshi Nakamoto, who published a white paper introducing the concept of a peer-to-peer electronic cash

system he called Bitcoin [6,7]. Bitcoin and Ethereum are the first two mainstream blockchains. Other modern Blockchains include Namecoin, Peercoin, Ether, and Litecoin. Figure 1 shows different components of Blockchain [8].

Blockchain combines existing technologies such as distributed digital ledgers, encryption, immutable records management, asset tokenization and decentralized governance to capture and record information that participants in a network need to interact and transact. As illustrated in Figure 2, a complete blockchain incorporates all the following five elements [9]:

- *Distribution:* Digital assets are distributed, not copied or transferred. A protocol establishes a set of rules in the form of distributed mathematical computations that ensures the integrity of the data exchanged among a large number of computing devises without going though a trusted third party. A centralized architecture presents several issues including a single point of failure and problems of scalability.
- *Encryption:* BC uses technologies such as public and private keys to record data securely and semi-anonymously. Completed transactions are cryptographically signed, time-stamped, and sequentially added to the ledger.
- *Immutability:* The Blockchain was designed so these transactions are immutable, i.e. they cannot be deleted. No entity can modify the transaction records. Thus, Blockchains are secure and meddle-free by design. Data can be distributed, but not copied.
- *Tokenization:* Value is exchanged in the form of tokens, which can represent a wide variety of asset types, including monetary assets, units of data or user identities.
- *Decentralization*: No single entity controls a majority of the nodes or dictates the rules. A consensus mechanism verifies and approves transactions, eliminating the need for a central intermediary to govern the network.

Blockchain is a distributed ledger technology that evolved from the Internet of information and represents a second phase of the Internet. It is somewhat similar to spreadsheets or databases because it is a database where information is entered and stored. BC is a decentralized form of record-keeping. The key difference between a traditional database (or spreadsheet) and a blockchain is how the data is structured and accessed.

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. A block is created whenever a transaction is made. Each transaction, referred to as a “block,” is secured through cryptography, timestamped, and validated by every authorized member of the database using consensus algorithms. Every transaction is attached to the previous transaction in sequential order, creating a chain of transactions (or blocks), as shown in Figure 3 [10]. In other Blockchain technology is the next evolution of the Internet., a block is the “current” part of a Blockchain, which records some or all of the recent transactions. Each BC blocks has a unique 32-bit whole number called a nonce, which is connected to a 256-bit hash number attached to it. The block is broadcasted to all nodes for validation. Once completed, a block goes into the Blockchain as a permanent database. Each time a block gets completed, a new one is generated. Each data item in a BC has a timestamp. A BC is an ordered chain of blocks. All data of a transaction are traceable based on the chain structure of BC. Figure 4 displays how BC works [11].

Blockchain technology is the next evolution of the Internet. Blockchain Africa has been a trending concept and has as a result of Africa’s crypto adoption rate. Blockchain Africa has significantly benefitted from this mechanism since it works under the principle of not having a central location for data. Blockchain Africa is illustrated in Figure 5 [12]. Nigeria, the current leading country in cryptocurrency, has also set its stage in Blockchain Africa.

USE OF BLOCKCHAIN IN AFRICA

The lack of modern agriculture, underdevelopment, unemployment, and poverty have slowed Africa's development in the twenty-first century. Blockchain technology in Africa offers alternatives to tackle their day-to-day problems. Some African countries have adopted blockchain technology, especially in the finance, energy, government, and agriculture sectors.

- *Finance:* Blockchain's utility for financial applications has been well-established, and African blockchain companies often focus on payment systems and remittances. The main benefit of cryptocurrencies is not relying on third-party financial institutions. The African continent is on the brink of a financial transformation powered by blockchain technology. Africa, a continent known for its resourcefulness and adaptability, is undergoing a fintech revolution. Inflation and corruption have fomented mistrust in central banks and fiat currency, so many African consumers see blockchain-based cryptocurrencies as a promising alternative. With over 1.3 billion people spread across 55 countries, diverse challenges and opportunities abound. The traditional banking systems have attempt without much success to reach remote areas and serve unbanked populations. This has often led to poor economic growth. Blockchain technology can potentially bridge the gap between traditional financial services and the unbanked in Africa [13]. Established financial institutions often come with numerous lending criteria and offer modest returns to lenders. However, African DeFi platforms like Finna Protocol are transforming the methods of lending and borrowing money. Financial institutions in Africa are becoming aware of blockchain technology's roles in improving financial services such as credits, loans, and payments. Digital payments have become a very important part of modern African society. A major problem financial institutions face in Africa is a lack of infrastructure.
- *Energy:* In Africa, the demand for electricity largely exceeds supply. For example, Nigeria's shortage of 173,000MW gave rise to large-scale imports of noisy and polluting power generating sets. The cost of generation and distribution of power is high. Economic and political reasons mean it will take a lifetime for these communities to be considered. The UN Sustainable Development Goal #7, targeting universal energy access for all by 2030, is driving a global consensus on renewable energy in off-grid communities. With the blockchain technology (that eliminates intermediaries), it is possible to establish an auditable encrypted ledger that can record energy consumption, credit histories, as well as provide energy trading between households; giving consumers more control of their energy requirements and consumption. Blockchain will inspire fast adoption of decentralized energy system in places with or without electricity. It will not only increase productivity among small energy consumers, but new ways of defining energy end-use will emerge [14].
- *Government:* Some African governments attempt different measures to eliminate corruption, bad governance, mismanagement of public funds, and lack of accountability in their countries but these efforts are mostly unsuccessful. Blockchain can help in solving some of these problems, with accountability and integrity built in the technology by design. The blockchain has been embraced at the level of civil society and is being addressed in political debates. The blockchain technology has the potential to transform governance in Africa, particularly in the areas of transparency, efficiency, and trust as well as improving governance and promoting economic growth. It is used in governance including land registries, voting systems, and public finance management. Startups can play a pivotal role in putting pressures on corporations and governments and forcing them to dismantle obsolete frameworks [15]. A government-wide implementation of blockchain technology could potentially help drive a general behavioral change in the society and drastically curtail systemic corruption and lack of accountability that plaque Africa. Countries like Kenya and Nigeria are exploring blockchain for secure identity verification and reducing fraud in government programs.

- *Property Administration:* One of Africa's pressing issues has been land ownership disputes and fraudulent transactions. Real estate and land property ownership is usually not effectively managed by African governments, making land disputes very difficult to deal with. Due to corruption and nepotism, attempting to fix this issue has been largely unsuccessful in the past. Having a system that ensures each record of ownership is not only immutable solves the corruption problem [16]. The blockchain transformation makes keeping and securing records of real estate ownership, titles, products, and private equity shares simple. Land titles can become immutable by underpinning it with blockchain technology. That way nobody can hack it.
- *Tax administration:* With corruption being the primary reason and cause of under-collected tax returns in most African nations, the blockchain technology could greatly benefit the economies, allowing the countries to collect billions in tax revenue that are being lost today. Because blockchain technology provides provenance, traceability, transparent and immutable information about transactions, fraud and corruption are almost impossible in the system and easier to detect [17].
- *Healthcare:* For example, Kenya also intends to change the health industry by introducing a blockchain-powered smart platform. Almost all public hospitals will now share a hub that facilitates data management, such as public resources and healthcare administrators.
- *Agriculture:* This is the backbone of many African economies. Blockchain can revolutionize the sector by providing transparency and traceability in supply chains. African nations, with their rich natural resources and agricultural products, can use blockchain to ensure the authenticity and quality of products, reduce fraud, and improve trade efficiency. Agrikore, a Nigerian platform, uses blockchain to connect farmers, buyers, and suppliers, ensuring fair pricing and increasing food security across the continent.

ADAPTING BLOCKCHAIN IN AFRICAN NATIONS

At the moment, Africa is one of the fastest-growing cryptocurrency markets in the world. Africa is a strong contender for developing technologies such as blockchain and cryptocurrency due to the continent's growing mobile tech adoption rates. Some African countries (like South Africa, Nigeria, Zimbabwe, Kenya, and Ghana) have adopted the decentralized approach, while some countries (like Cameroon, Ethiopia, Lesotho, Sierra Leone, Tanzania, and the Republic of Congo) have banned crypto. The current situation of cryptocurrency in Africa is shown in Figure 6 [18]. We consider the following selected countries in Africa [19-22].

- *South Africa:* South Africa has been one of the region's leaders in terms of crypto regulation and the development of supportive trading frameworks. The nation's proactive approach to regulation has removed a lot of regulatory uncertainty. The predominant use case for crypto in South Africa revolves around investment. Citizens of the country have traded billions of dollars worth of digital currency in recent years. In South Africa, the government is collaborating with others from the BRICS group of countries (which also include Brazil, Russia, India, and China) on research into blockchain's potential for trade and other enablers of growth. Meanwhile, Standard Bank (the continent's largest financial institution) has joined Marco Polo, a blockchain-based trade finance network, which will help unlock access to blockchain finance throughout the 20 African countries where it operates.
- *Nigeria:* Nigeria boasts the largest population and economy in Sub-Saharan Africa, as well as the largest cryptocurrency economy. Blockchain has been one solution to Nigeria's economic challenges. Since 2016, Nigeria has suffered from an unstable political situation, the COVID-19 pandemic, and the collapse of oil prices. Thus, Nigerians are facing high unemployment problem, causing some to migrate to other nations. Nigeria's uncertain economic environment has encouraged many citizens to seek financial alternatives, increasing the value proposition of

cryptocurrency. In 2022, the nation cooperated with Bitt Inc for its digital currency, eNaira, shown in Figure 7 [22]. The move comes from the rising enthusiasm among companies and regulators throughout the continent to use distributed-ledger technology. Nigeria has also embraced blockchain technology in the education sector. The Nigeria Customs Service is currently looking into the possibilities of blockchain to enhance its operations. Nigeria has one of the most dynamic peer-to-peer Bitcoin trading markets in the world, but so far the country has banned cryptocurrency.

- *Kenya:* This is the East Africa's largest economy and is among the nations that have adopted blockchain technology in Africa. Kenya is already a hotbed of innovation in Africa. It has also been at the forefront of service digitization in the region. Kenya has already benefited from the adoption of M-PESA, the mobile money services. BitPesa, a money remittance network that converts digital currencies to local African currencies without involving third parties, has gained traction in Kenya. Kenya also intends to change the health industry by introducing a blockchain-powered smart platform and establish a fully automated Universal Patient Portal in Kenya (UPP). Consequently, AfyaRekod will provide patients and health personnel with real-time access to medical data and history through a secure central platform. In addition, Kenya's National Transport Safety Authority (NTSA) has also incorporated blockchain technology into its operations to revolutionize the transport industry. This will ultimately enable all vehicles to have electronic stickers on their windscreens, hence facilitating the recovery of stolen vehicles.
- *Ghana:* The Ghanaian government is set to become the first African country to use blockchain technology in its e-government processes. Since 2020, the Ghanaian government has raked 201 billion cedis in revenue from the services portal, money that could not be obtained initially due to bureaucratic hurdles and time-consuming processes. Ghana intends to introduce a digital currency known as e-Cedi, which will be the ultimate weapon in the fight against corruption. The central bank recently launched a regulatory "sandbox" that will allow banks, companies, and others to develop and pilot new blockchain-based products for merchant payments and remittances. In Ghana, Bitland has used blockchain to create a secure land registry, reducing land disputes and enhancing property rights. This innovation ensures that individuals have rightful land ownership, fostering economic growth and stability. The University of Ghana announced plans for a blockchain-based certificate management system.
- *Central African Republic:* This is the first country in Africa, and the second in the world after El Salvador, to designate Bitcoin as a legal tender. The Bank of Central African States (BEAC) has banned the use of crypto for financial transactions in the Economic and Monetary Community of Central Africa (CEMAC), which the Central African Republic is a member of.

BENEFITS

Among the evangelists, there is a consensus that blockchain is an opportunity to catch up with developed economies by embracing a technology that would allow to leapfrog and thwart the creation of soon-to-be obsolete bodies. In spite of its seeming complexity, blockchain has clear real-world relevance for improved trade facilitation, especially in Africa. Blockchain technology has the potential to help Africa overcome several developmental obstacles, such as poverty, a lack of financial inclusion, and a lack of trust in institutions. Efforts to harness blockchain for tangible, real-world benefits are increasing. Bitcoin, as the foremost and widely recognized cryptocurrency, is increasingly being adopted in Africa as a means of payment. Blockchain's list of potential applications is endless. Other benefits of blockchain in Africa include the following [23-25]:

- *Privacy:* Data decentralization in the distributed databases is very secure as it comes with the concept of cryptography. Blockchain helps in enhancing online privacies by allowing users to

store their own digital footprints on their individual unique blockchain and control who can actually access them.

- *Financial Inclusion:* Through blockchain-based solutions, individuals can access financial services such as banking, lending, and remittances without the need for traditional banking infrastructure. DLT can facilitate financial inclusion by providing access to banking services for the unbanked and underbanked populations.
- *Transparent Governance:* Blockchain technology can enhance transparency and accountability in governance by creating immutable records of transactions and activities. Governments can use blockchain for voter registration, transparent procurement processes, and secure land registries, reducing corruption and improving trust in public institutions.
- *Supply Chain Management:* DLT enables transparent and efficient supply chain management by tracking the movement of goods from production to consumption.
- *Cross-Border Payments:* Blockchain facilitates cross-border transactions. Complex and unpredictable trade policies, as well as costly and time-consuming border procedures, continue to hold back African economies from their full trading potential. Blockchain technology can streamline cross-border payments and remittances by eliminating intermediaries and reducing transaction costs. African countries with high volumes of remittance inflows can leverage blockchain-based solutions to improve the efficiency and affordability of remittance services.
- *Identity Management:* Blockchain-based digital identity solutions can help address identity fraud and provide individuals with secure identities. This is particularly important in Africa, where many people lack formal identification documents, hindering their access to essential services.
- *Tokenization of Assets:* Tokenization transforms physical assets into digital assets on the blockchain. Blockchain enables the tokenization of assets, allowing individuals to fractionalize and trade assets such as real estate, commodities, and artwork. African countries can tokenize their assets to unlock liquidity, attract investment, and democratize access to investment opportunities.
- *Development Aid and Philanthropy*: Blockchain technology can enhance transparency and traceability in development aid and philanthropy by providing donors with visibility into the use of funds and ensuring that aid reaches its intended recipients. This can help improve the effectiveness of aid programs and increase donor confidence.
- *Customs Clearance:* Implementation of the African trade agreement is still in its early stages, and customs processes vary across Africa. This red tape, typical of traditional customs systems, is a key impediment for small and medium-sized enterprises (SMEs) that are ready to enter global trading networks but do not yet have the financial resources to navigate the intricacies of the bureaucracy.With blockchain, this complex process can be digitalized and streamlined, saving significant amounts of time and money.
- *Traceability:* The ability to accurately track cross-border shipments is crucial to the verifiability of standards and certifications, as well as the reliability and timeliness of delivery. Traditional methods of tracing are opaque, lack standardization, and are susceptible to interference and fraud. Blockchain has shown great promise in increasing transparency to overcome these obstacles. Its open-source yet secure nature allows companies to assign and verify certifications easily. Already, blockchain is enabling a range of African products to reach end consumers through ethically verified supply chains.

- *E-payments and Trade Finance:* In any given trade transaction, exporters, importers, and banks engage in a complex flurry of financial assurances and legal paperwork to show both sides that the other will make good on the deal. This paper-based system delays both the movement of goods and the payment cycle for such transactions. Blockchain technologies streamline ways that organizations can track and verify the authenticity of such documentation, reducing transaction time and cost.
- *Low Costs of Remittance:* Under normal circumstances, when people wish to borrow from each other, they go through intermediaries like banks. With the introduction of the blockchain, the use of third parties has been removed, leading to faster transaction processing.
- *Creation of Jobs*: The development of bitcoin as a common currency in Africa has opened many doors for job creation in many companies and industries.

CHALLENGES

All technologies have drawbacks, and blockchain is no exception. While the potential of blockchain in Africa is great, challenges persist. Regulatory uncertainty, lack of infrastructure, and limited awareness are some challenges that need to be addressed.

Other challenges of blockchain in Africa include the following [4,26-28]:

- *Scalability:* Blockchain networks can be slow and inefficient due to the high computational requirements needed to validate transactions. As the number of users, transactions, and applications increases, the ability of blockchain networks to process and validate them in a timely way becomes strained. Ensuring the ability of the blockchain network to handle a massive volume of transactions both rapidly and precisely is essential if it is to help address the scale of corruption in public procurement across Africa.
- *Energy Consumption:* The process of validating transactions on a blockchain network requires a lot of computing power, which in turn requires a lot of energy. This has led to concerns about the environmental impact of blockchain technology.
- *Lack of Standardization:* The lack of standardization arises issues such as interoperability, increased costs, and difficult mechanisms, making mass adoption an impossible task. This is acting as a barrier for the entry of new developers and investors as well.
- *Governance:* Blockchain governance is still in its infancy, and there is no clear consensus on how to govern these decentralized systems. This lack of governance can lead to conflicts between stakeholders and can make it difficult to implement changes or upgrades. In markets with no regulatory bans, we tend to see the industry develop more responsibly as the market operates above the ground, with more productive interaction between regulators and exchanges.
- *Security:* While blockchain technology is considered secure due to its decentralized nature, it is not immune to attacks. There have been several high-profile hacks and security breaches in recent years.
- *Privacy:* Privacy and the protection of sensitive information remains imperative. Blockchain systems need robust safeguards against unauthorised access.
- *Infrastructure:* A major challenge is that several people in Africa do not have access to the Internet, and so they cannot use blockchain technology. For blockchain implementation, nations require foundational tech infrastructure, like a stable electricity supply, secure Internet connections, data storage and processing capacities, etc. Such infrastructure is scarce in many African countries at the moment. The continent is well known for its unstable power supply and low internet connectivity. Blockchain can still be utilized in Africa even if the infrastructure

needed to support it is not situated on the continent. All you need is a data enabled mobile phone.

- *Knowledge Gap:* Introduction of blockchain would demand specialized expertise, which may currently be lacking. In spite of the rapid growth and progress made, there remains a significant knowledge gap on blockchain among corporate leaders and decision-makers. More corporate education on the benefits of blockchain technology is needed. This lack of knowledge and understanding hinders the potential for further growth and progress. It is imperative that we bridge this gap and educate those in positions of power . Efforts should be made to educate businesses, government officials, and the general public about the benefits of blockchain technology, including increased transparency, security, and efficiency.
- *Corruption:* Corruption and fraud are classic problems in Africa. Government expenditure on goods, services, and the funding of projects is plagued by corruption in Africa. The substantial amounts of money involved, the intricate processes, and sometimes questionable ties between officials and businesses make public procurement a fertile ground for corrupt practices. Blockchain technology has emerged as a promising solution to reform public procurement and drastically curb corruption. Blockchain's inherent transparency enables the real-time oversight of procurement, ensuring each step is meticulously recorded, eradicating opportunities for covert malpractices.
- *Regulation:* Regulating a highly volatile and decentralized system remains a challenge for most governments, requiring a balance between minimizing risk and maximizing innovation. Resistance from regulators is one of the biggest challenges of cryptocurrency in Africa. Any approach to regulate blockchain technology should commence with a clear consensus on regulatory objectives that are based on the particular positions of the governments involved.
- *Fear:* Some countries have banned cryptocurrency. Policymakers are worried that cryptocurrencies can be used to transfer funds illegally out of the region, and to circumvent local rules to prevent capital outflows. If crypto assets are accepted by the government as means of payment, it could put public finances at risk.
- *Talent Shortage:* There is a massive shortage of the talent and resources required to build the solutions the continent needs to accelerate development. The current workforce needs to broaden its skillset. Since we have few blockchain experts on the continent, the logical thing to do is train more but it is not easy.
- *Lack of Government Support:* Another notable problem is the lack of government support. We await a government-backed framework for blockchain technology

In spite of these challenges, several African nations have already shown an inclination towards using blockchain. Initiatives in South Africa, Nigeria, and Rwanda illustrate the potentially transformative power of the new technology.

CONCLUSION

A blockchain is an incorruptible digital ledger. It has been heralded as a "game changer" for the development of African economies. Blockchain technology offers distinct advantages over database technology as it provides for thrustless recording of transaction data without relying on an existing intermediary. Although blockchain was originally used to create Bitcoin, today, it has universal applicability. As the technology continues to make inroads in global supply chains, governments, companies, and organizations have the chance to accelerate its adoption and reap the benefits of lower transaction costs, efficient delivery, increased exports, and more inclusive growth. With continued investment, collaboration, and education, Africa has the opportunity to become a global

leader in blockchain technology. This also presents the potential for greater socio-economic inclusiveness.

Africa has consistently been one of the smallest cryptocurrency markets or the smallest crypto economy of all regions. It is currently tackling challenges to technologies and innovation in the journey to embracing the blockchain technology. Blockchain has the potential to transform economic activity and improve living standards in Africa. Blockchain technology in Africa remains crucial as the continent attempts to ascend the growth ladder. The future of cryptocurrency in Sub-Saharan Africa looks bright and promising. For more information about blockchain in Africa, one should consult the following related journal: *Blockchain: Research and Applications.*

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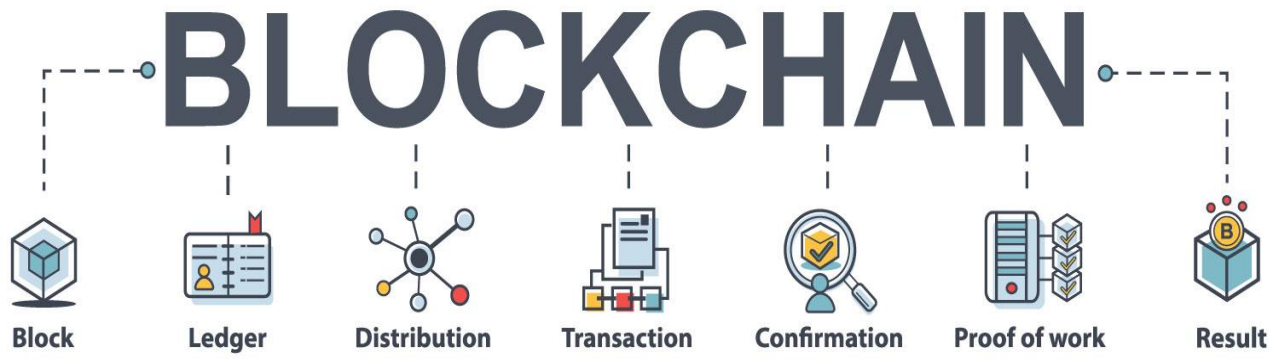

Figure 1 Different components of Blockchain [8].

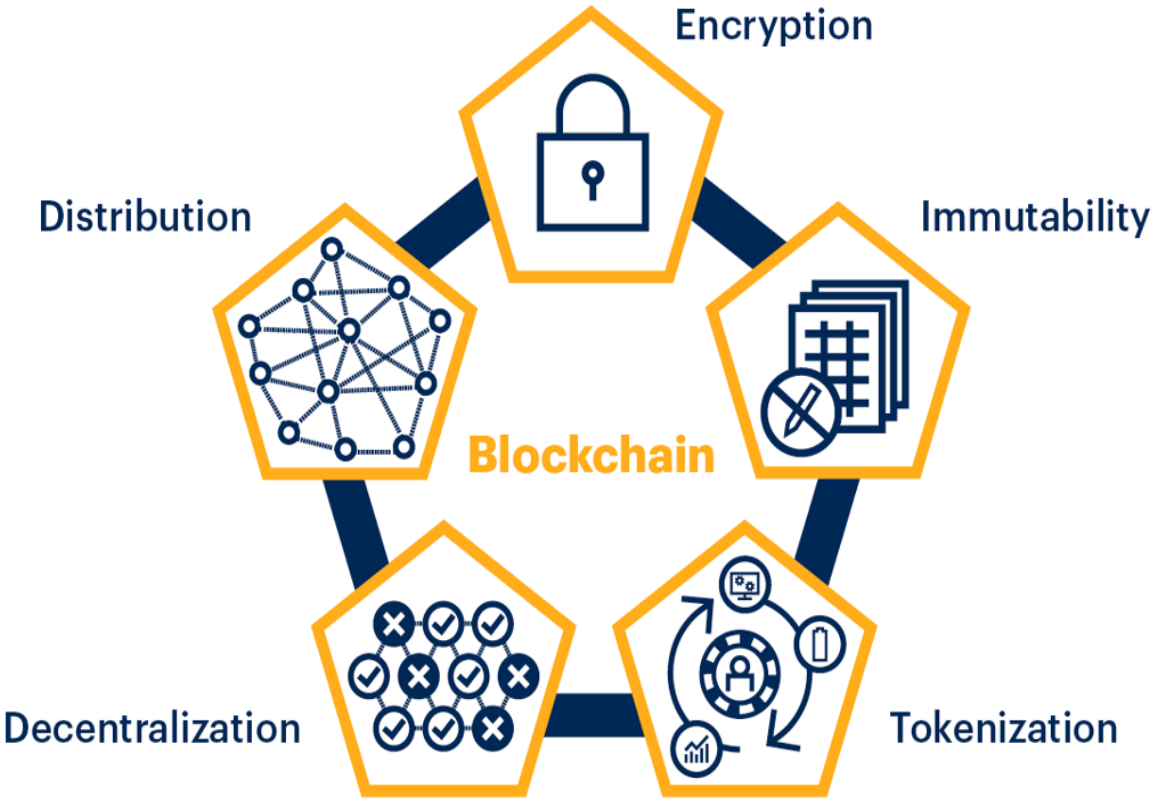

Figure 2 Five key elements of Blockchain [9].

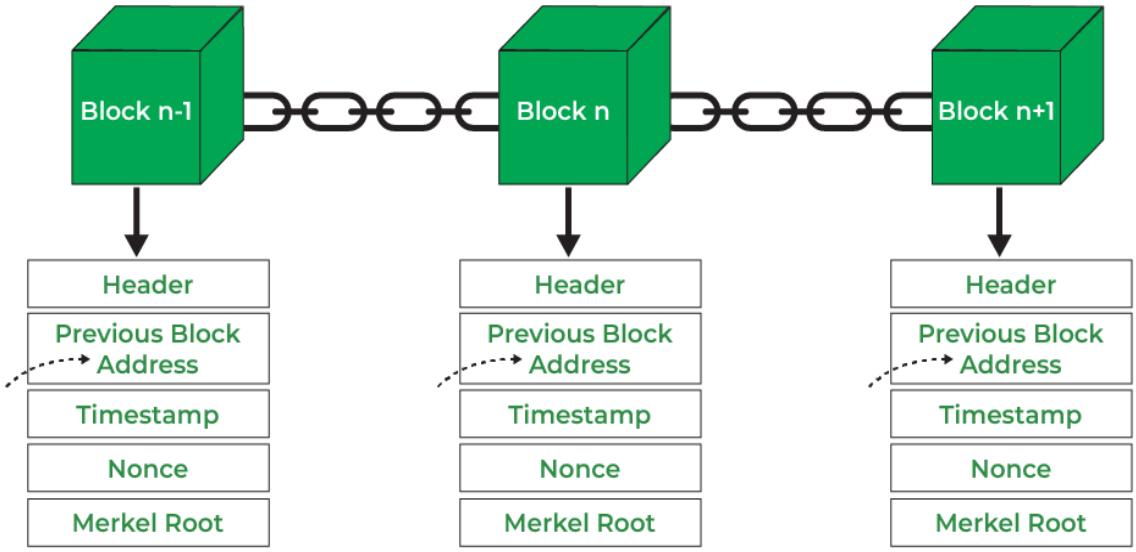

Figure 3 A chain of transactions (or blocks) [10].

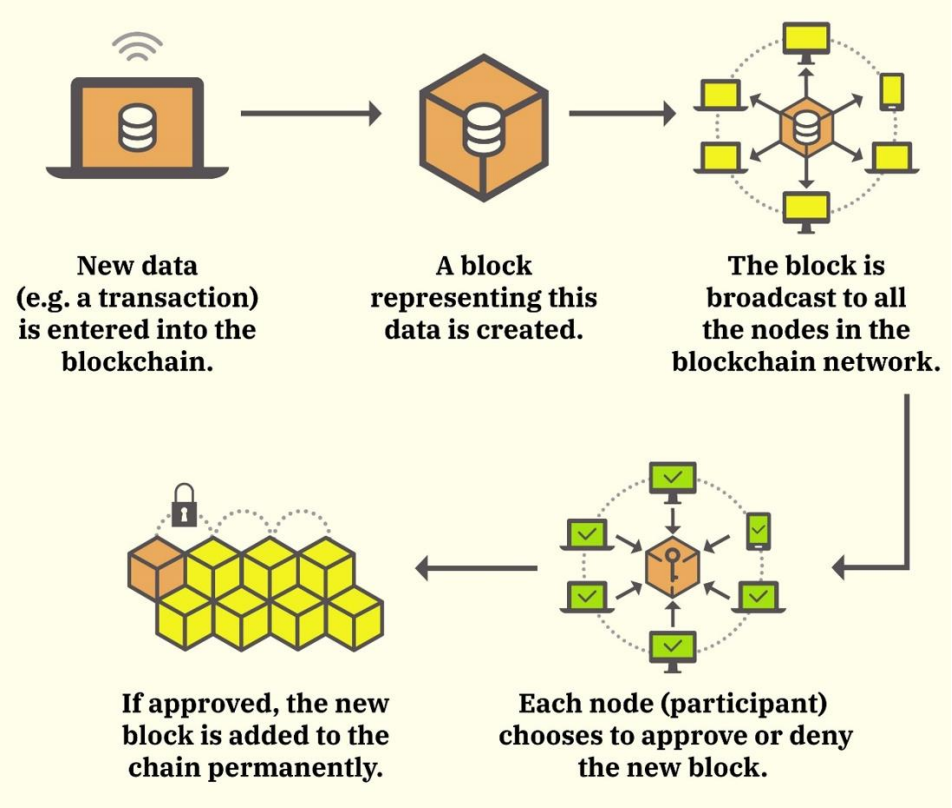

Figure 4 How Blockchain works [11].

Figure 5 Blockchain Africa [13].

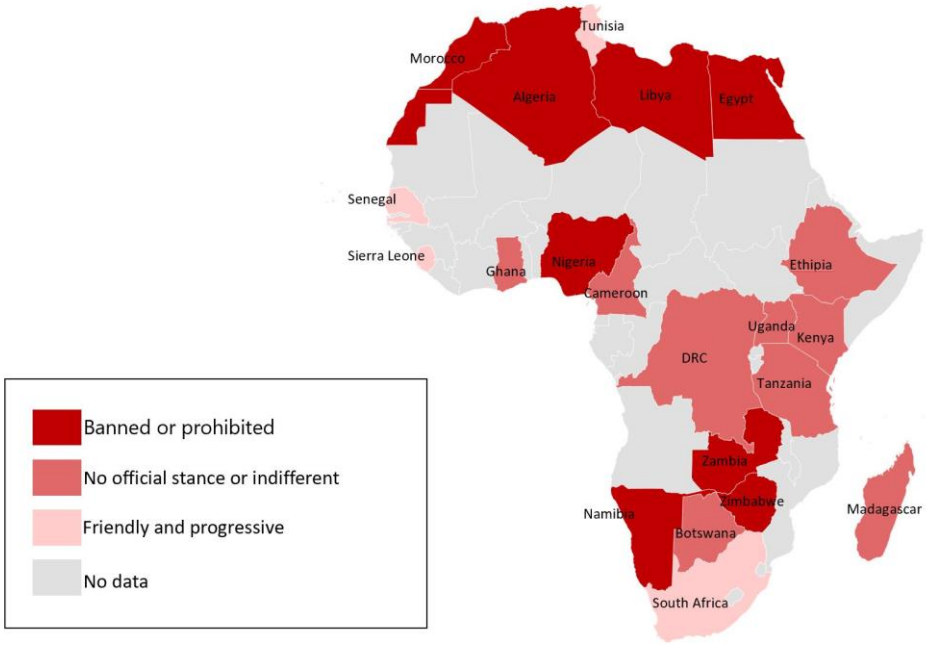

Figure 6 The current situation of cryptocurrency in Africa [18].

Figure 7 Electronic currency eNaira of Nigeria [22].