# BLOCKCHAIN TECHNOLOGY

Corruption is one of Africa's huge cancers, eating deep into the coffers of African governments, gradually impeding growth and political stability. We often hear governments promising to fight corruption in their campaign manifestos, but once they assume office, their commitment to accountability suddenly disappears. Approximately 58% of Africans believe that corruption has increased over the years (Transparency International, 2015), which is surprising given the recent advancements in technology. According to the African Development Bank (ADB), African economies lose an estimated amount of $10 billion annually to corrupt practices (African Development Bank, 2023). The Corruption Perception Index (CPI) also indicated that 90% of African countries scored below 50 out of 100 (Transparency International, 2024), meaning that most of the continent's finances are lost to corruption. One can only imagine how significantly countries like Nigeria and Ghana, which are rich in natural resources, might have developed in the absence of corruption. But in this era of technological advancements, Blockchain has emerged as a transformative tool for governance, offering secure and transparent ways to reduce corruption.

Blockchain is a distributed database and a decentralised, immutable ledger for financial transactions. It is a digital, immutable database, meaning past transactions cannot be modified or erased. This ensures transparency, and no person has control over it. Blockchain technology is behind cryptocurrencies such as Bitcoin, Ethereum, Ripple and many others. Blockchain technology was first introduced in 1991 by Stuart Haber and W. Scott Stornetta while looking for a solution for time-stamping digital documents to avoid modification or misdating, but more innovations and research were made such as the Merkle tree in the following years but the ice breaking was done in 2008 by Satoshi Nakamoto in his white paper titled the "Bitcoin: A Peer-to-Peer Electronic System" where he modified the Merkle

Tree model and created a more secure system to keep history of data exchanged, which became the backbone of Blockchain leading to release of Bitcoin in 2009 (Asmare et al., 2023)(DiliTrust, n.d).

Blockchain has some interesting design choices that make it a fascinating option. Blockchain has timestamps that record the exact time a transaction occurs and is recorded in a chronological order to prove that this data or transaction once existed. This makes the system transparent between peers since no third party is required. The timestamps are grouped into blocks and placed inside a unique cryptographic hash (Nakamoto, 2008). Blockchain use of cryptographic hashing and linking blocks is a key design feature that has shaped its current capabilities by ensuring immutability, ensuring recorded data cannot be modified. Blocks (the grouped timestamps) are hashed using a one-way cryptographic function like SHA-256, converting the block(data) into a fixed-length string of characters. This process is irreversible. The blocks are interlinked, and the next block contains the hash of the previous block and its hash. And if a hacker tries to alter a hashed transaction (block), the block hash will be changed, hence breaking its link to the next block. This makes your data or transactions immutable, rendering most hacking attempts futile.

Decentralization is another core feature of blockchain, which is the distribution of authority and control across a network of its users instead of a single centralized authority. Each member of the ledger has the same copy of data in the form of a distributed ledger (Pardeshi & Sharada, 2022), which increases trust and data integrity because it reduces the risk of data being manipulated by a centralized entity. Blockchain operates on a decentralized network of nodes, each node carries a copy of the blockchain, and if any changes are made to a node, those alterations are rejected since all nodes are synchronized with the same data. In

instances where one node is inaccessible, other nodes can be utilized to retrieve the necessary information (Singh, 2024). Making blockchain open source has also increased transparency because it makes it easy to detect authorized or authorized changes. Decentralization plays a crucial role in ensuring trust, security, data integrity and data recovery.

Blockchain's immutability is built on its cryptography hashing, decentralization and consensus. These principles collectively shape the current form and capabilities of Blockchain technology.

Examining core features of blockchain exposes it as a viable technology that can benefit governance and transparency in Africa if it is adopted. The notion of free and fair elections sounds like a myth in Africa, with vote rigging resulting in deaths, violence, conflicts and many other despicable acts, an example is Kenya 2007-2008 election leading to the loss of over 1000 lives (Koko, 2013). Integrating blockchain into the voting system would help reduce vote rigging and all the corrupt practices that come with it, while accelerating the voting process. This system would automatically verify voters and facilitate voting. The system's immutable and decentralized nature means no one can hack to rig votes or bribe someone to do so, since there is not one person in charge, thereby increasing trust and bringing about transparency. Also, queuing in long queues under the sun deters eligible voters from voting. Still, electronic voting would serve as an encouragement since they can cast their vote from any location once they have access to the internet. Countries like Estonia, Switzerland, Australia, Norway and a few other countries have adopted this system of voting (Vladucu et al., 2023).

Corruption has led to poverty, economic hardship and political instability, and one of the causes of the rise of coups d'état on the African continent. In the past 5 years, Africa has experienced about nine(9) successful coup d'état (Al Jazeera, 2023), with corruption from the

elite or ruling government playing a key role in these coups amid other causes like poor governance, etc (Adams et al., 2025)(Quân đội nhân dân, 2023). But Blockchain reveals a promising way to reduce corruption. African Governments should adopt public blockchain as a ledger to record all of the government's expenditures, contracts and spending. Public blockchains are open and accessible to anyone to view and participate without needing permission from a central entity (Eigelshoven et al., 2020). This transparency makes corrupt practices easily traceable, and the system's immutability ensures officials cannot alter records to serve their interests, thereby making them more accountable and responsible. Public blockchains will also enable citizens to know how their taxes are being spent, and also make auditing easier because it is decentralized, and anyone can have access (U4 Anti-Corruption Resource Centre, 2020).

Blockchain technology has a lot of positive influence on its users, by increasing their trust and confidence in the government and will also make government officials and institutions more accountable and responsible (De Filippi, 2020). Transparency and accountability are the core principles of good governance. Blockchain will empower citizens to demand their rights and auditing when they notice bad spending of their taxes and finances. But implementing Blockchain would also sideline a certain group of people who do not have access to electricity on the continent or country. "On average across 39 countries, Afrobarometer survey teams found that 68% of the enumeration areas (EAs) they visited had electric grids that most houses can access. The presence of electric grids varies widely across countries." (Msafiri & Adjadeh, 2024). This means about 32% of Africans would be excluded if the continent adopts this technology, as access to electricity is necessary to utilize it. According to David L. Share, "Literacy in Africa can be summed up in a single word – disastrous. On worldwide rankings (PIRLS, 2016), African countries lie at the very bottom of

the 50-nation list."(Share, 2023) meaning blockchain adoption would also segregate the literates and illiterates because it would require a level of literacy and digital literacy for one to understand and use the technology.

Blockchain has shown a lot of benefits like immutability, reducing corruption, increasing transparency, trust and accountability, automating a lot of paperwork, but it comes along with its effects, which include an issue of privacy when using public blockchains. The transparency of public blockchain seems interesting at the beginning, but it also poses a privacy risk by exposing sensitive and private information and transactions, which can lead to privacy breaches and threats. Another disadvantage is its high energy dependence and high cost of implementation (Kuzior et al., 2019). About 65% of electricity users in four of the five power pools in Africa experience power outages every month, and even in the best-performing regions, about 30% of electricity users still experience power outages and 80% in the worst-performing areas (Nduhuura et al., 2018). This means most countries have no capacity to adopt this technology since it demands a lot of electricity. And a couple of countries may not have the capacity to implement it.

Blockchain has a very high potential to curb corruption in our governments, but our continent also needs to implement the needed infrastructure to integrate it into our systems.

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