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USMANU DANFODIYO UNIVERSITY, SOKOTO

41st Inaugural Lecture

Unveiling the Digital Revolution: Cryptocurrency, Blockchain, and the Future of Finance

By

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Counterparty
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DEDICATION

I dedicated this inaugural lecture to the supervisors of my doctoral thesis for their guidance and support. Dr Kamaluddeen Kamilu Kayode (KKK) was my major supervisor, I am deeply grateful for all his efforts. I also appreciate the contributions of Profs. Aminu Diyo Sheidu and Bashir Abdullahi as co-supervisors on my committee. Their expertise and feedback improved my work and shaped my future as a researcher. Profs. Aminu Salihu Mika'ilu, B.A.S. Muhammad and the late Dr Saidu Muhammad B/Yauri were three other mentors who added flavours and spices to my academic journey. Dr Saidu played a pivotal role in establishing a solid groundwork for my path towards becoming a professor of finance.

Together, these individuals demonstrate their commitment to my advancement in academic pursuits. The extent to which their dedication and guidance contributed to my progress cannot be overstated. I am profoundly grateful to them for their invaluable assistance in attaining this academic feat.

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PREFACE

The tradition of inaugural lecture series has been a long-standing practice in academic institutions worldwide. It serves as a symbolic induction of professors into their respective academic communities, or 'cults.' Nevertheless, this occasion can prove to be a source of anxiety for academics. The pressure to deliver a distinctive, timely, and original lecture can leave many professors indecisive.

I became a professor in December 2010, and I joined the 'dilemma-stricken' group of professors, mesmerising on what area and topic to present as my inaugural lecture. A series of episodes of procrastination punctuated this, foremost is the syndrome that 'other senior colleagues should present before me.' There was also a stream of pressure from those who believed one could quickly do it, which was immediately followed by the defensive-resistance phrase 'I am working on it, and I will soon present'. I chose to say this because many colleagues right now face this dilemma.

As you delve into the pages of this document, it is noteworthy to mention that this inaugural lecture marks the third one within the Faculty of Management Sciences and the second in the Department of Business Administration. Therefore, I am encouraging all to put aside this procrastination, set a time plan, and do it. It is normal to delay because of the old institutional culture of

not 'pushing.' Still, with the rapidity in the sequence of presentations orchestrated by this current administration, the next could be yours, just as with all the procrastination, it is now my turn. I wish you good luck.

As a professor of finance and a pioneer director of the UDUS Directorate of Investment, I settled on a topic that has direct bearing on my interest and research efforts and that may disrupt the future of finance.

1.0 INTRODUCTION

Vice Chancellor sir, ladies, and gentlemen, welcome to this inaugural lecture on the captivating intersection of cryptocurrency, blockchain technology, and the future of finance. Today, we will x-ray the transformative potential of these innovations and their profound impact on the financial landscape.

First and foremost, my deep attachment to the field of finance. I take great delight in thinking back to my undergraduate years, when my passion with finance field first blossomed and ultimately earned me the prize of the best student in finance during the 1991 convocation. I was fortunate enough to have the late Dr. Saidu Birnin Yauri as a mentor during both the undergraduate and postgraduate years, who was a major contributor to my passion for finance. I set out on a route that would eventually form my career in the academia, propelled by his enthusiasm and direction. When I started working for the University in 1994, I jumped at the chance to instruct and motivate students in a variety of finance-related courses, giving them the tools to succeed was incredibly satisfying. Completing my doctorate was a turning-point in my career. It gave me the opportunity to broaden my knowledge, carry out in-depth study, and go deeper into the world of finance. Fortunately, again, my Ph.D. thesis was adjudged as the best by the National Universities Commission Nigerian Universities Doctoral Theses Award

Scheme in 2005, with a prestigious award for the best Ph.D. in the discipline of administration within the Nigerian University system. This remarkable achievement further solidified my passion for finance and reaffirmed the importance of my work in the field.

This crucial experience allowed me to bring fresh ideas and progress to the discipline in addition to deepening my understanding of the subject. I am glad to share that my own experience serves as evidence of the transforming potential of learning, caring, and perseverance. Being able to influence future financial professionals and leave a lasting impression on the field is a benefit that comes with being a professor of finance.

Indeed, my previous research focused on the quest to stabilise the fragile traditional financial system, with special reference to Nigeria. My thesis titled "Strategic Management and Corporate Survival: An Evaluation of Turnaround Strategies in the Nigerian Commercial Banking Sub-Sector 1986-1998" focused on the Nigerian banking industry that was in turmoil, with many banks declared distressed and insolvent. Many commercial banks closed their doors, crashing the fortunes of many investors and depositors. The focal point of the study was to identify the underlying factors contributing to bank distress and failure and develop a workable turnaround model to stem the tide of bank failures as the latter are uniquely severe, with an unparalleled potential for

contagion. Consequently, we successfully formulated two warning models employing both univariate and multivariate methodologies to predict banking system failures. These models serve as invaluable guides for banking institutions, regulatory authorities, and various stakeholders, including depositors, creditors, and investors. The study recommended practical measures for turning ailing banks around. Unfortunately, while Nigeria was grappling with bank distress and failure within its financial system, similar challenges were prevalent in financial systems worldwide, characterised by widespread turmoil and instability.

To compound this, later in 2008, we witnessed the emergence of a global financial crisis, which exacerbated the existing financial turmoil and exposed the vulnerability of financial systems, with far-reaching impacts on various sectors of the global economy. This crisis was more extensive and global than any other period of financial turmoil in the previous 60 years or since the Great Depression of the 1930s. Its impact affects all economies, making it difficult to quantify the extent of loss and damage caused to governments, businesses, and individuals. The financial crisis of 2008 led to a loss of trust in financial institutions and in government in general.

In Africa, the consequences were great, as the crisis hit the continent directly, and the effects were particularly

felt in the financial sector. For example, volatility on the stock markets increased since the outbreak of the crisis, with losses of assets on the major stock exchanges. In Egypt and Nigeria, the stock market indices declined by approximately 57 percent between March 2008 and March 2009. Kenya, Mauritius, Zambia, and Botswana equally experienced significant losses. The crisis, therefore, highlighted the inherent interdependence of global financial systems and their profound impact on economies. It also brought attention to problems including excessive leverage, murky financial operations, and the vulnerability of centralized financial institutions. This was a wake-up call and highlighted the need for improved regulatory oversight, improved risk management practices, and a comprehensive understanding of the complex dynamics within the global financial landscape.

Consequently, the academic community intensified its research endeavours to prevent future financial crises and develop early warning systems to detect potential crises in advance. Scholars and researchers have directed their efforts towards understanding the underlying causes of financial turmoil and identifying mechanisms to mitigate its impact. The aim was to enhance the resilience of the financial system and create effective frameworks for crisis prevention and management. By exploring these critical issues, the academia sought to contribute to the overall stability and

sustainability of the global financial landscape. In my quest to contribute to the stability of the banking industry and, by extension, to the financial system, I have published many papers that are germane to this area, as summarized in Table 1.1.

Table 1.1 Selected Research Works in the Banking Industry and Financial Sector

Title of Paper	Other Details
A Univariate Approach to Predicting Failure in Commercial Banking Sub-Sector	Nigerian Journal of Accounting Research. Department of Accounting, ABU Zaria, 2004, 70 – 84
A Pragmatic Approach to the Causes and Consequences of Bank Distress in Nigeria	ABUJELMAS. ABU ZARIA, 2005, 141 - 161. Ahmadu Bello University, Journal of Education, Legal and Management Studies
Corporate Failure and Turnaround Strategies in the Banking Industry	Nigerian Journal of Accounting and Finance, Federal University of Technology Yola, 2009, 163-173 Vol. 1 No. 2
Impact of Financial Assistance and Holding Actions in the Nigerian Banking Industry	Publication in Nasarawa State University Journal of Administration. Volume 5 Number 2, August 2010 pp 85 – 105
Predicting Bank Distress in Nigerian Banking Industry: A New Discriminant Analysis Model	Journal of Finance and Accounting Research, Department of Accounting, Faculty of Administration, Nasarawa State University, Keffi. Volume 2,

	Number 3, September 2010, pp 1 – 16
Determinants of Banking Efficiency Scores in Nigeria	KASU Journal of Management Sciences, Vol. 5, No. 1 June 2013 by M. M. Maishanu and Muhammad Auwalu Haruna pp 1-17
Two-Stage Analysis of Banking Efficiency in Nigeria	Muhammad Auwalu Haruna and Malami Muhammad Maishanu Proceedings of the 11th International Conference of DEA, June 2013, Samsun, Turkey, ISBN: 978 1 85449 477 1. Pp 395- 401
Impact of Bank Compliance with Accounting Standards on Profitability, Asset Base and Number of Branches in Nigeria	Aminu Abdullahi and M. M. Maishanu –Studies in Humanities Journal, UDUS. Vol. 8, January – December 2015
Global Financial Crisis and its Impact on Africa	Globalisation in Africa: Perspectives on Development, Security, and the Environment" published by Lexington Books - A Wholly Owned Subsidiary of Rowman & amp; Littlefield Publishers, Inc. 2016, pp 99 – 117.
Banking Productivity as a Core Value Towards Financial Inclusion in Nigeria.	Maishanu M. M. & Haruna M. A. (2018). The Accounting Frontier Volume 15 No. 2 published by the Nigerian Accounting Association,

	ISSN: 0189-1743, December pp 1-27
Exploring the Compatibility of Cryptocurrencies with Islamic Principles: A Theoretical Examination	In the process of being published

In response to the aftermath of previous crises and their far-reaching consequences, a new paradigm emerged that questioned the established order and advocated for the introduction and institutionalization of an alternative or, at best, complementary system. Interestingly, the emergence of the idea of cryptocurrency coincided with the 2008 global financial crisis, which was attributed to the imprudent actions of large financial institutions. When the concept of cryptocurrency emerged in 2008, there was already a prevailing feeling of disillusionment and dissatisfaction with the traditional, fiat-based financial system. Many people lost confidence in the system, felt cheated, and suffered significant economic losses. In this context, the crypto-based system challenged the status quo and promised to address the prevailing sentiments and offer a possible solution through its decentralised nature.

Will the crypto-based financial system compete with the traditional financial system when it comes to

understanding the needs and complexities of this modern era? Could it provide missing links and provide a source of stability and confidence that have gradually eroded in the traditional banking system? Is cryptocurrency a fad that will fade with time? Will Bitcoin and other alternative currencies eventually displace traditional currencies and become as ubiquitous as the dollar and euro? What role will blockchains play, and will they be attractive to everyone and make financial transactions seamless? Will the crypto-based system based on blockchain ensure data protection, which is an important concern for investors and users of the new currencies? Will cryptocurrencies become the future of finance?

The desire to address these concerns captured my attention, influenced my decision to choose this topic for my inaugural lecture, and stimulated my growing interest in this area of research. This paper aims to unravel the complexities of cryptocurrency and blockchain technology and explore their potential as investment options and future currencies.

This paper is divided into six sections, each addressing specific aspects of the topic. The first section, the current introduction, discusses the motivation for choosing this area of study. Section two looks at the evolution of money and traces its evolution from the barter system to the emergence of digital money. This section provides insights into the concept and evolution

of money throughout history. In the third section, the paper aims to demystify the intricacies of cryptocurrency and blockchain technology. It provides a comprehensive understanding of these concepts, unravels their complexities, and illuminates their potential applications. Section four focuses on Nigeria's position in the global cryptocurrency landscape and examines its role and involvement in the cryptocurrency space. It analyses Nigeria's current position and its implications in a broader global context. Section five takes a forward-looking perspective and examines the future of finance by examining the interplay between cryptocurrencies and blockchain technology. This section explores the potential impact and transformative impact of these technologies on the financial landscape. Section six concludes the paper and presents a series of suggestions for the global community, with specific recommendations tailored to Nigeria. These suggestions aim to promote a deeper understanding of cryptocurrency and blockchain technology and guide future actions and policies in this rapidly evolving area.

2.0 CONCEPT AND ORIGIN OF MONEY

Discussions about cryptocurrencies cannot be completed without understanding the concept of money and its historical antecedents. The heart of any financial system is its ability to ease the exchange of goods and other services through an accepted medium of exchange.

Money, or currency, has served as a modern medium of exchange for centuries, and as its form, denomination, use, and acceptance change, it affects how the financial system functions. Money is therefore defined as any "identifiable object of value that is generally accepted as a means of payment for goods and services and for repayment of debts in a market" (ProvidentMetals:2023). Money serves as a unit of account that represents a standardized measure of value and as a store of wealth that allows individuals to save and accumulate financial assets.

The development of money can be traced back to the early stages of human civilization. In a primitive barter system, people exchange goods and services directly, relying on the coincidence of their wants. However, this system has inherent limitations as it requires a double coincidence and is therefore inefficient for complex transactions. To address the problems of battering, various articles have featured money in different times and places, from the very primitive to the primitive to the modern. Money took different forms over time, namely a more stable, portable, and acceptable form. Davies (2002) lists only a tiny fraction of the enormous variety of primitive money recorded in history. These include amber, pearls, cowries, drums, eggs, feathers, gongs, hoes, ivory, jade, cauldrons, leather, mats, nails, oxen, pigs, quartz, rice, salt, thimbles, umiacs, vodka, wampum, yarn, and zappozats (decorated axes).

The concept of money has gone through various stages of evolution, adapting to changing times, geographical contexts, and prevailing circumstances. These stages can be categorized as follows: (i) Commodity money: In the initial stages of human civilization, goods with intrinsic value, such as salt, livestock, or shells, served as a medium of exchange. (ii) Metallic Money: As society progressed, valuable metals like gold and silver were used as a standardized form of money. Coins made from these metals are widely accepted and kept in circulation. (iii) Paper Money: With the growth of trade and commerce, the issue of paper money backed by precious metals became common. (iv) Credit money: The expansion of banking systems has led to the emergence of credit. This form of money is created through loans and credit and allows individuals to transact based on trust and future repayments. (v) Plastic Money: The introduction of plastic cards like credit cards and debit cards revolutionized the way transactions are conducted. These cards enabled electronic transfers and eliminated the need for physical currency. (vi) Digital Money: The current phase of money is characterised by the rise of digital currencies and cryptocurrencies. Digital money exists purely digitally and can be transferred electronically. Cryptocurrencies like Bitcoin are based on decentralized blockchain technology and offer new possibilities for secure and borderless transactions.

Table 2.1 provides an overview of the historical progression of money, highlighting its evolution from commodity money to digital money, including the stages discussed above. This serves as a snapshot of the history of money, highlighting the transformative journey that has brought us into the present era of digital and cryptocurrency.

Table 2.1: The History of Money – A Timeline

10,000+ years ago	Barter	This involves the exchange of resources and/or services for mutual benefit between 2 or more parties.
9000 – 6000 BC	Cattle	Cows, sheep, camels, and other livestock are the first "standardised" form of barter. Later, items like grain and other vegetable and plant products also became standard.
1200 BC	Cowrie Shells	China was the first area of the world to use these shells as money, but their use did spread to many other civilisations. Many areas of Africa used cowrie shells as currency up until the mid-20th century.
1000 BC	First coins	Near the end of the Stone Age, China began making imitation cowries out of bronze and copper, which are base metals. These are considered by many to be the earliest form of metal coins.

500 BC	Modern coins	In other parts of the world, round coins were developed out of lumps of silver and stamped with different gods and emperors, depending on the location.
100 BC – 1800 AD	Various other items are used for money	Even though coinage as we know it began around 500 BC, other items were used as money too - leather, Potlach, Wampum, etc.
806 AD	The first paper money	Paper banknotes first appeared in China and were used from around the 9th to 15th century. Around 1455, paper money disappeared in China for several hundred years. It re-emerged in Europe a few decades later, but it was another 3 centuries before it was considered common.
1792-1816 AD	The Gold Standard	Although the U.S. began tying its currency to precious metals with the 1792 Mint and Coinage Act, 1816 was the seminal year, when gold was adopted as the official standard of value in England. Many countries adopted the gold standard, where the value of their currency was tied to a specific

		amount of gold. This system provided stability but limited monetary flexibility as per the history of money.
1930s AD	The Great Depression and the End of the Gold Standard	The Great Depression brought major changes in money and is considered the first stage of failure for the gold standard. The first step was revising the gold standard, which involved confiscating individual gold holdings and increasing its price, which devalued the paper currency that represented the gold. By the 1970s, the dollar was completely delinked from gold.
1944	Bretton Woods System	After World War II, the Bretton Woods Conference established a new international monetary system, where currencies were pegged to the U.S. dollar, which was convertible to gold.
1971	End of the Gold Standard	President Richard Nixon announced the suspension of the U.S. dollar's convertibility to gold, effectively ending the gold standard and transitioning to a system of fiat currencies.

Late 20th Century – Present	Digital Currency	The rise of computers and the internet led to the development of digital currencies and electronic payment systems, making it easier to conduct transactions online.
2000s – Present	Cryptocurrencies	Bitcoin, created by an anonymous person or group known as Satoshi Nakamoto, was introduced in 2009. It marked the beginning of cryptocurrencies, which are decentralised and based on blockchain technology.
21st Century	Mobile Payments and Digital Wallets	The proliferation of smartphones led to the widespread use of mobile payment apps and digital wallets, allowing people to make transactions and store money digitally.
Ongoing	Central Bank Digital Currencies (CBDCs)	Some central banks are exploring the creation of digital versions of their national currencies to modernize the financial system and enhance payment.

Sources: https://www.providentmetals.com/knowledge-center/precious-metals-resources/history-of-money.html, https://testbook.com/history-of/money

The historical existence of money in various forms played a significant role in shaping economies and cultures. From commodity money to representative money to fiat money, each type serves as a crucial medium of exchange, unit of account, and store of value. By delving into the concept and history of money, we can gain a deeper understanding of the motivations behind the creation of cryptocurrencies and their potential to revolutionise various aspects of finance. By understanding the evolution of money, we can understand the context in which cryptocurrencies emerged. As we navigate the complexities of the digital age, cryptocurrencies have the potential to reshape the financial landscape and offer innovative solutions to long-standing challenges.

3.0 DEMYSTIFYING CRYPTOCURRENCY AND BLOCKCHAIN

3.1 Cryptocurrency

Concept

The debate surrounding the financial crisis had a significant influence on the ideology underlying Bitcoin (Binance, 2018). Generally speaking, cryptocurrencies have special qualities, including increased security, transparency, and the possibility of wider financial inclusion. By using blockchain technology to facilitate decentralised and irreversible transactions, cryptocurrencies aim to reduce dependence on

intermediaries and increase trust in financial transactions. In just a few years, cryptocurrencies have grown from a digital curiosity to a trillion-dollar technology that has the potential to completely disrupt the global financial system in a few years. The practice of investing in and paying for a variety of goods and services, such as software, virtual real estate, and illegal drugs, using Bitcoin and thousands of other cryptocurrencies is growing in popularity.

In Nigeria, the term 'cryptocurrency' often triggers a range of peculiar thoughts and concerns in the minds of individuals. Some of these include associations with the infamous MMM Ponzi Scheme and other similar fraudulent schemes, concerns about security, and negative perceptions linked to activities such as Yahoo-yahoo. While these issues of concern exist in both traditional financial systems and the crypto-system, it is important to acknowledge that the crypto-system is not immune to such challenges. Scams and fraudulent activities have occurred within the cryptocurrency space, underscoring the need for caution and awareness.

Cryptography, which is the study of advanced encryption, is utilised in the creation and management of digital currency, or cryptocurrencies (Barone, 2019). One of the main characteristics that distinguishes cryptocurrencies from conventional fiat currencies is their decentralised nature. Additionally, because cryptocurrencies are

decentralised, there is no single point of failure (Szabo, 1994). The remaining nodes in the network can continue to validate transactions and maintain the integrity of the blockchain, even if one fails. This makes it exceedingly difficult for a single entity to manipulate the currency or shut down the network. However, there are other drawbacks to cryptocurrency decentralization (Garcia & Martinez-BBC, 2017). Preventing fraud and safeguarding investors can be challenging due to the absence of laws and control.

For a cryptocurrency to gain widespread acceptance within the mainstream financial system, it must meet certain criteria. Primarily, it should incorporate robust mathematical complexity to deter fraudulent activities and hacking attempts while remaining user-friendly and accessible to consumers. Decentralisation is also pivotal to ensure consumer protection and establish safeguards against single points of failure. Moreover, a reputable cryptocurrency should strike a delicate balance between maintaining user anonymity and preventing illicit activities such as tax evasion and money laundering.

Key characteristics of cryptocurrencies include the following.

- Decentralization: One of the key characteristics of cryptocurrencies is their decentralised nature. Unlike traditional forms of currency, which are controlled by central authorities, such as

governments or financial institutions, cryptocurrencies operate on decentralised networks. This means that transactions can be conducted directly between individuals without the need for intermediaries. The decentralised nature of cryptocurrencies enhances transparency, eliminates the need for trust in centralized entities, and empowers individuals to have direct control over their digital assets.

- Security and Privacy: Cryptocurrencies utilise advanced cryptographic techniques to secure transactions and control the creation of new units. Cryptography ensures the integrity and authenticity of transactions, thereby making cryptocurrencies highly secure and resistant to fraud and tampering. Although not all cryptocurrencies offer complete anonymity, many provide a certain level of privacy in transactions. Instead of using personal information, cryptocurrency transactions are typically identified by unique digital addresses, helping to protect the identities of users.
- Transparency: Despite the anonymity offered by cryptocurrencies, their underlying technology, known as the blockchain, promotes transparency. A Blockchain is a public ledger that records all transactions chronologically and immutably. This

transparency allows anyone to verify and audit transactions, thus contributing to trust and accountability within the cryptocurrency ecosystem.

- Limited Supply: Many cryptocurrencies have a predetermined maximum supply. For example, Bitcoin has a maximum supply of 21 million coins, and Litecoin (LTC) has 84 million coins. This finite supply is achieved through a process called "mining. The limited supply feature ensures scarcity and contributes to long-term value appreciation. Limited supply is typically achieved through mechanisms such as halving events or fixed issuance schedules.
- Global Accessibility: Cryptocurrencies transcend geographical boundaries and provide access to financial services and opportunities for individuals worldwide. As long as one has an Internet connection, they can participate in cryptocurrency transactions regardless of their location or traditional banking access.

History

The history of cryptocurrencies began with the release of Bitcoin, the first decentralised cryptocurrency, in 2009. Bitcoin, a pioneering cryptocurrency using blockchain technology, was written by an individual or

group under the pseudonym Satoshi Nakamoto. Although Satoshi's identity is still unknown, his white paper is titled "Bitcoin: A Peer-to-Peer Electronic Cash System," posted on a cryptography mailing list. - Cryptography is a key element of security and auditability, and it underlies all cryptocurrency and blockchain technologies. This white paper describes the principles and technical details of cryptocurrency and forms the basis for its subsequent development and introduction. On the same day, the first block of the Bitcoin blockchain, known as the "Genesis block," was mined, marking the official launch of the Bitcoin network. Since the introduction of Bitcoin, the cryptocurrency landscape has seen exponential growth in the number of alternative currencies. Thousands of cryptocurrencies are now in use, and many more are in various stages of development. This proliferation of digital currencies has led to the development of a robust financial infrastructure, with fintech companies playing a key role in driving innovation in the cryptocurrency space.

Bitcoin itself had a humble beginning and was initially devoid of any significant value. In fact, in 2011, the value of one Bitcoin was equivalent to a dollar. However, over time, the value of Bitcoin fluctuated and surged. It experienced considerable volatility influenced by numerous factors, such as market demand, regulatory developments, and investor sentiment. Table 3.1 provides an overview of the value of Bitcoin over the years, showing its dynamic nature and the fluctuations it has

undergone during its existence. This volatility has contributed to the development of cryptocurrencies as potential investment assets and has raised concerns about their stability and suitability for mainstream adoption.

Table 3.1: Value of Bitcoin over the years

Year	Start	High
2009	No value	
2010	$0.003	$0.40
2011	$0.30	$32
2012	$4.70	$16
2013	$13.30	$1,163
2014	$805	$936
2015	$318	$465
2016	$434	$981
2017	$966	$19,892
2018	$13,657	$18,343
2019	$3,844	$13,017
2020	$7,200	$29,096
2021	$28,951	$68,789
2022	$46,379	$47,835
2023	$16,537	$42,000
April 29th 2024	**$63,454.48 = N86,277,152,82 at exchange rate of 1,359.67**	

Source: https://bitcoinmagazine.com/guides/bitcoin-price-history

According to Bitcoinmagazine.com (2023), Bitcoin has faced numerous declarations of extinction, totalling 463 instances. The history of Bitcoin has been characterised

by significant turbulence and notorious price volatility. It has experienced remarkable surges in value, with appreciation rates as high as 1,000%, followed by substantial drops of 80% or even 90%, as observed in 2014. As illustrated in Table 3.1, Bitcoin did not have a market price during its initial year. Furthermore, it did not receive premine or secure funding from prominent venture capital firms. However, a turning point occurred in 2010, when Bitcoin started being exchanged for goods and services. On May 22, 2010, Hanyecz historically conducted the first documented real-world transaction using Bitcoin. He exchanged 10,000 Bitcoins for two pizzas from Papa John's (Upadhayay:2023). See Figure 3.1 which shows a picture of Hanyecz and the two large historic pizzas. This singular transaction paved the way for the development of the vibrant and alternative currency system as it exists today.

Figure 3.1: Picture of Hanyecz and the two Large Historic Pizza

Source: https://www.hindustantimes.com/ht-img/img/2023/05/22/550x309/laszlo_hanyecz_1684750792964_1684750815329.jfif

In 2020, Bitcoin experienced a remarkable price increase of more than 300%. This remarkable growth has contributed to the new success and wider acceptance of Bitcoin, as many investors have gained significant wealth through their exposure to this cryptocurrency. Thus, Bitcoin's steady growth has made it an attractive investment option for many people.

Alternative Currencies (Altcoins)

In addition to Bitcoin and its growing success and notoriety, there are thousands of alternative cryptocurrencies known as altcoins. All coins and tokens outside of Bitcoin were considered altcoins. These

alternatives have emerged in response to the growing popularity and acceptance of cryptocurrencies and aim to provide diverse options for decentralised transactions and financial systems. Due to the open-source nature of blockchain, altcoins and their respective platforms can be created by anyone with an internet connection and come in a growing variety. This has prompted numerous companies to launch various cryptocurrencies, such as:

- Litecoin: Litecoin is currently regarded as Bitcoin's leading rival, and it is designed to process smaller transactions faster. The main difference between the two is that Litecoin is built for speed, boasting a block time four times faster than Bitcoin, whereas Bitcoin prioritises maximum security and immutability.
- Ripple (XRP) was launched by OpenCoin, a company founded by technology entrepreneur Chris Larsen in 2012. Like Bitcoin, Ripple is both a currency and a payment system.
- MintChip: Unlike most cryptocurrencies, MintChip is the creation of a government institution, specifically the Royal Canadian Mint.
- USDT or Tether (USDT): This cryptocurrency is designed to be a stablecoin, meaning its value is intended to remain stable and pegged to a specific asset or currency.

- Ethereum (ETH) is a decentralised open-source blockchain platform that enables the creation and execution of smart contracts and decentralised applications (DApps). It was proposed by Vitalik Buterin in late 2013 and officially launched in 2015.

Other altcoins include USD Coin (USDC), Binance (BNB), Binance Coin (BUSD), Cardano (ADA), Solana (SOL), Dogecoin (DOGE), Dai (DAI), etc. Each one has its own technological design and functionality. According to Becher (2022), altcoins are created to meet needs arising from perceived gaps in the market that are not addressed by Bitcoin. He adds that each digital asset is created for a specific purpose, some of which overlap. The major types include the following:

- Utility tokens: These provide services within a network, such as purchasing services, paying network fees, and redeeming rewards.
- Payment tokens: These are used as currencies to exchange value.
- Security tokens: These are tokenised assets offered on stock markets held by an entity and regulated by the Securities and Exchange Commission.

- Stablecoins: A stablecoin's value is pegged to an external reserve asset such as fiat currencies or precious metals to offer relative price stability.
- Memecoins: Inspired by viral internet trends, memecoins are often created to exploit short-term gains.
- Governance tokens: These utility tokens grant users voting rights within a decentralised blockchain.

To facilitate trading, bitcoin and altcoins are traded through crypto exchanges. According to Powell (2023), a crypto exchange is a marketplace where you can buy and sell cryptocurrencies such as Bitcoin, Ether, or Dogecoin. Cryptocurrency exchanges work much like other trading platforms do. They provide investors with accounts where they can create different order types to buy, sell, and speculate in the crypto market. There are nearly 600 cryptocurrency exchanges worldwide, inviting investors to trade Bitcoin, Ethereum, and other digital assets (Forbes:2023). However, Blockspot.io (2023) documented well over 1500 exchanges, including all platforms and protocols that investors can choose from to exchange crypto to crypto or crypto to fiat. These exchanges charge all sorts of fees, such as trading, withdrawals, and other fees.

Mining

Crypto mining shares similarities with traditional mining for valuable resources such as gold and silver. Both require the use of specialized tools and effort to uncover valuable assets. In the context of cryptocurrencies, miners use computer hardware and software to solve complex algorithms. By successfully solving these algorithms, miners play a crucial role in validating transactions on cryptocurrency networks. When a new transaction occurs, it must undergo verification before being recorded to ensure its accuracy. Miners participate in a competitive process to be the first to solve the complicated mathematical problems associated with this verification. The miner who completes the task first gets the opportunity to securely log the transaction information on the blockchain ledger, which serves as the basis for the currency. As a reward for the validation work, the miner receives newly issued coins that are added to his digital wallet.

This process of miners unravelling algorithms serves two purposes. First, it ensures the security and integrity of the blockchain. Second, it steadily increases the overall supply of the cryptocurrency in a decentralised manner. By devoting their computing power to unlocking coins and verifying peer-to-peer transactions, miners contribute to the maintenance of public transaction ledgers that eliminate the need for centralized authorities. This benefit both miners and users by enhancing the trustworthiness of the network.

It is worth noting that while traditional crypto mining relies on computer hardware, alternative methods have emerged, including mobile mining. With the increasing processing power of modern smartphones, individuals can now participate in mining activities using their mobile devices. This opens new avenues for involvement in the crypto-mining ecosystem, making it more accessible and inclusive.

Digital Wallets

Digital wallets play a key role in the use and security of digital currencies. They are software programs or applications that people use to hold and transact their crypto assets. Wallets have two key components: public and private keys. These function similarly to combinations of safes protecting tangible valuables. The public key can be shared freely as it is only used for receiving funds. Meanwhile, private keys must remain secret, as they allow the wallet owner to authorize outgoing payments. Within crypto wallets, these keys work together behind the scenes to confirm user identities on blockchains. When making deposits or withdrawals, the private key digitally signs transactions encrypted with the public key. This verifies ownership without sharing sensitive details.

Several types of wallets cater to different requirements and preferences. Some wallets store cryptographic keys directly on devices, ensuring local control and security. On the other hand, certain wallets rely on third-party

services for enhanced protection. These wallets facilitate the seamless sending, receiving, and monitoring of crypto holdings in a secure digital format, benefiting both individuals and businesses. In essence, wallets function as a digital counterpart to traditional bank accounts, simplifying the management of cryptocurrencies in a manner analogous to conventional finance. In the current landscape, there is a wide array of wallets that have gained popularity among cryptocurrency users. Some notable examples include Coinbase Wallet, Ledger Nano S, Trezor, MetaMask, Trust Wallet, MyEtherWallet (MEW), Uniswap, and Edge Wallet, among others. These wallets cater to diverse needs and offer features such as secure storage, user-friendly interfaces, support for multiple cryptocurrencies, and integration with decentralised applications.

Smart Contracts

Smart contracts allow digital agreements to be securely automated and enforced without centralised oversight. Much like traditional paper contracts, they define the terms governing transactions and transactions between parties. But instead of relying on third parties, smart contracts use code on blockchains to directly control the transfer of funds or information.

The main purpose of smart contracts is to make certain types of agreements self-enforcing. When programmed

conditions are met, the terms are automatically carried out from all sides. This transparency removes the need for trusted intermediaries, as all rules are visible to participants upfront. Smart contracts work by linking payments between users to pre-defined outcomes in the code. If all terms are checked out, the blockchain instantly facilitates the exchange hassle-free. But if requirements are not fulfilled on schedule, the transaction will not go through.

In general, smart contracts can lower settlement risks and streamline a lot of multi-step transactions. By integrating compliance into decentralized networks, they allow for new forms of instantaneous, transparent, and trustless online interactions.

Investing in Cryptocurrencies

The Vice-Chancellor sir, and respected ladies and gentlemen, some of you may be wondering right now if investing in cryptocurrency is worthwhile and secure. Well, if an individual contemplates investing in cryptocurrencies, it would be prudent to approach such an endeavour with the same level of caution as any other highly speculative venture. Thorough research is crucial before committing funds to this domain. While some cryptocurrencies have experienced substantial gains, investors must enter the market with a realistic expectation of high volatility and the potential for losses. The value of cryptocurrencies is determined solely by

market demand rather than tangible assets, which contributes to their speculative nature. Consequently, prices can experience rapid fluctuations in response to various economic and social factors. An illustrative case is the significant drop of over 50% in Bitcoin's value within a single day in 2013. Such unpredictably sharp swings entail substantial risks for those seeking stability in their investments.

Indeed, the high volatility inherent in the cryptocurrency market also presents potential opportunities. Astute traders have capitalised on market fluctuations, reaping substantial profits. Additionally, certain cryptocurrency projects are actively developing platforms with tangible use cases, suggesting long-term potential beyond mere speculation. Regarding crypto speculation, it is important to differentiate between short-term speculation and long-term investment. While there are risks involved in any form of investment, some individuals engage in crypto assets as a long-term investment strategy. Established cryptocurrencies like Bitcoin, Ethereum, and others have demonstrated significant growth and returns over time. Many market operators and analysts predicted that the value of bitcoin would reach $500,000 between 2025 and 2027 (Constantino, 2022).

Rather than outright dismissing cryptocurrencies, it is wise to adopt a cautious approach by investing only what one can afford to lose. Diversifying holdings and regularly

reassessing investments based on ongoing project developments are essential. It is crucial to acknowledge the inherent uncertainties of this nascent market while remaining open to emerging technologies. For those averse to risk, it is advisable to focus on lower-risk assets. However, cryptocurrency does offer research-driven investors the chance to capitalise on disruptive innovations, provided they proceed with caution and accept the possibility of short-term price fluctuations. Conducting thorough due diligence on both opportunities and risks is of utmost importance.

3.2 Blockchain Technology

A blockchain, as described by Nakamoto (2008), is an innovative technology that operates as a decentralised and distributed ledger. It enables the secure and transparent recording of transactions across a network of computers. Each participant in the network maintains a copy of the ledger, ensuring the immutability and visibility of the recorded information, as noted by Szabo (1994). Until recently, the utilisation of blockchain technology was primarily limited to digital currencies and the financial industry, with few applications extending beyond those domains. The application is now widespread in areas such as healthcare technology, insurance, cybersecurity, supply chain management, transportation and mobility, and energy and Infrastructure etc.

The mechanism of blockchain technology can be dissected into several crucial components, each playing a significant role in its functioning and effectiveness. These components encompass transactions, consensus mechanisms, and smart contracts. By harmoniously integrating these elements, blockchain technology enables the secure and transparent storage and verification of transactions, fostering trust and integrity within the cryptocurrency ecosystem.

Transaction

This is the transfer of wealth between parties (Lee, 2015). This transaction is included in a block, which is an assortment of all the network transactions that have occurred (Nakamoto, 2008). The blockchain, a collection of blocks that house all the network's transactions, is appended to new blocks as they are formed (Szabo, 1994). A network of nodes that each have a copy of the blockchain maintains the blockchain (Narayanan, Shi, & Zhang, 2016). For illustrative purposes, see Figures 3.2 and 3.3 below:

Figure 3.2: How Blockchain Works

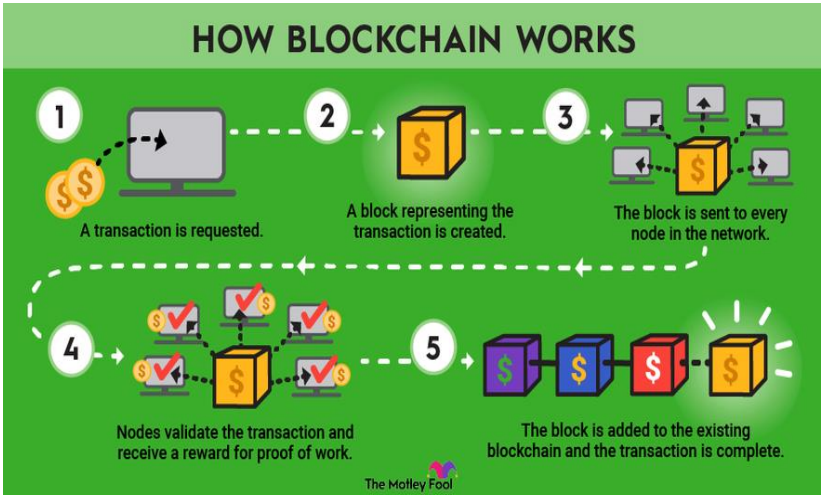
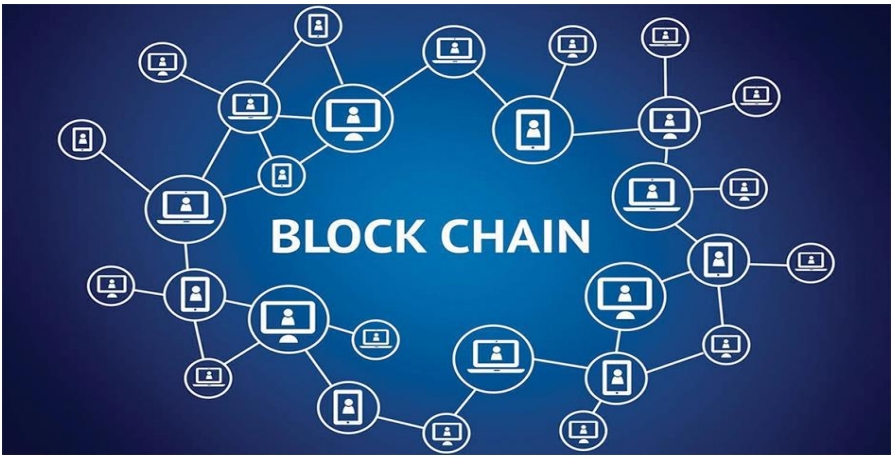


Image source: The Motley Fool

Figure 3.3: Block Chain and Network of Nodes



Source: Wenner M. (2017), **Blockchain Technology Explained and What It Could Mean for the Caribbean**

The consensus mechanism

This is how nodes on the network agree on the blockchain's current state (Nakamoto, 2008). This is accomplished using a sophisticated algorithm that calls on nodes to resolve a challenging mathematical issue (Szabo, 1994). A node is paid with a specific quantity of cryptocurrency after solving the puzzle and is permitted to add a new block to the blockchain (Nakamoto, 2008). Examples of consensus mechanisms used by different cryptocurrency projects are Proof of Work (PoW), Proof of Stake (PoS), Delegated Proof of Stake (DPoS), Proof of Authority (PoA), Practical Byzantine Fault Tolerance (PBFT), Directed Acyclic Graph (DAG), etc.

Smart Contract

The smart contract, the last element of blockchain technology, is a self-executing contract with the details of the agreement encoded directly into code (Szabo, 1994). Without the requirement for a central authority, smart contracts can be used to facilitate a variety of transactions, including the transfer of assets and the execution of business logic (Lee, 2015).

Blockchain Properties

According to Wenner (2017), blockchain possesses five key properties that have the potential to revolutionise and disrupt various industries. These properties include

being distributed, encrypted, inclusive and transparent, immutable, and historical.

Because blockchain is distributed, data and transactions are kept across a network of linked devices rather than in a single, centralized location. By doing this, the dependence on a single point of failure is removed, and security and resilience are increased. Blockchain technology uses encryption to guarantee the security and protection of data and transactions. Because of the strong layer of cryptographic protection it offers, unauthorized parties cannot access or tamper with the data. Because blockchain is open and transparent, a wide range of people and organizations can participate, which promotes responsibility and confidence. Transparency is promoted, and the need for intermediaries is decreased when all network users can view and validate the transactions. Due to its immutability, a transaction cannot be changed or removed once it has been recorded and verified on the blockchain. This feature increases the data's dependability and integrity on the blockchain, making it more resilient to fraud and tampering. Finally, every transaction and event on the blockchain is documented and kept in chronological order due to its historical nature. As a result, a thorough and auditable history of all actions is created, offering a reliable source of information.

The value of blockchain technology lies in its ability to enable trusted transactions between individuals who may be total strangers. This authentication occurs through the collaborative efforts of a network of interconnected devices, motivated by collective self-interest rather than profit-driven entities or government authorities seeking to maintain power and surveillance. These unique properties of blockchain technology open opportunities for developers to create applications across a wide range of industries and purposes.

Impacts of Blockchain on Banks and Payment Processors

Blockchain technology has indeed revolutionised the way transactions are conducted by enabling peer-to-peer interactions without the involvement of intermediaries like banks or payment processors. It has introduced disruptive challenges to banks and payment processors. The utilization of peer-to-peer transactions and cryptocurrencies holds the potential to supplant conventional financial intermediaries and centralized ledgers traditionally overseen by financial institutions (CBinsights, 2022). This disintermediation can reduce costs by eliminating transaction fees typically imposed by payment rails administered by intermediaries (CBinsights, 2022). As a result, the financial landscape is undergoing a transformative shift, prompting industry players to adapt and explore innovative approaches to remain relevant in this evolving ecosystem.

Blockchain technology also enhances the security of payment processing by employing encryption and recording transactions across a decentralised network of computers (Daystar Payment System, 2023). This transparent and decentralised ledger system makes it highly challenging for any single entity to manipulate or tamper with the data, instilling confidence in businesses and consumers regarding the security of their financial information.

The cryptocurrency sector encompasses a variety of services, including lending, and is increasingly being recognised as an alternative to conventional financial components. Crypto lending, for instance, is a decentralised finance service that allows investors to lend their cryptocurrency assets to borrowers. In return, lenders receive regular interest payments in cryptocurrency, like the interest earned from traditional savings accounts (Duggan, 2023). This emerging trend in decentralised finance presents new opportunities for individuals to participate in lending activities within the crypto ecosystem.

Traditional payment methods can entail several intermediaries, which raises transaction costs and causes delays. Blockchain technology, on the other hand, eliminates the need for intermediaries, enabling quicker and more effective payment processing. It only takes a few minutes to execute a transaction, no matter where

you live. Transparency is one of the main benefits of blockchain technology for processing payments. Every transaction is entered into a public ledger that is available to every network user. Transparency lowers the possibility of fraud and builds stakeholder trust. Companies may monitor and confirm payments, eliminating the need for manual reconciliation and guaranteeing the correctness of financial documentation. In a similar vein, customers may easily access their payment history, giving them more authority and insight into their financial dealings.

More financial inclusion could be facilitated by blockchain technology and cryptocurrencies, especially in underprivileged areas (Nelms et al., 2018). These technologies allow direct peer-to-peer transactions without the need for intermediaries, thereby addressing the entrance hurdles in traditional financial systems that require bank accounts and credit ratings (Chui et al., 2016). People who live in remote or underprivileged locations and may not have access to or cannot afford standard banking services may benefit from this enhanced accessibility (Kanengoni, 2018). Financial services can be made available to a larger audience by utilizing blockchain technology and cryptocurrencies, empowering those who were previously shut out of established financial institutions. By giving people more control over their financial activities, this may help to promote economic empowerment and reduce poverty.

4.0 NIGERIA'S POSITION IN THE GLOBAL CRYPTOCURRENCY LANDSCAPE

The most common criticism of cryptocurrencies in Nigeria revolves around their connection to criminal activities. The decentralised nature of cryptocurrencies makes it difficult for law enforcement to exercise control over them, as they are deliberately designed to function without a central authority. Although Bitcoin trading is not explicitly banned in Nigeria, it remains unregulated, and banks and other financial organisations are prohibited from engaging in such activities (Uba & Legal, 2021).

In February 2021, the Central Bank of Nigeria (CBN) issued a circular to banks and financial institutions announcing that trading in cryptocurrencies and providing payment services to cryptocurrency exchanges were prohibited. The financial institutions were also directed by the apex bank to identify and close the accounts of individuals or companies trading in cryptocurrencies or operating cryptocurrency exchanges. The CBN argues that cryptocurrencies are not legal tender and are produced by unregistered and unregulated companies, making their use illegal in Nigeria. Concerns also revolve around the anonymity of cryptocurrencies, their vulnerability to illegal activities such as money laundering and terrorist financing, the lack of Know Your Customer (KYC) protocols, and the volatility of cryptocurrencies,

which the regulator says pose a threat to the stability of the financial systems in other countries.

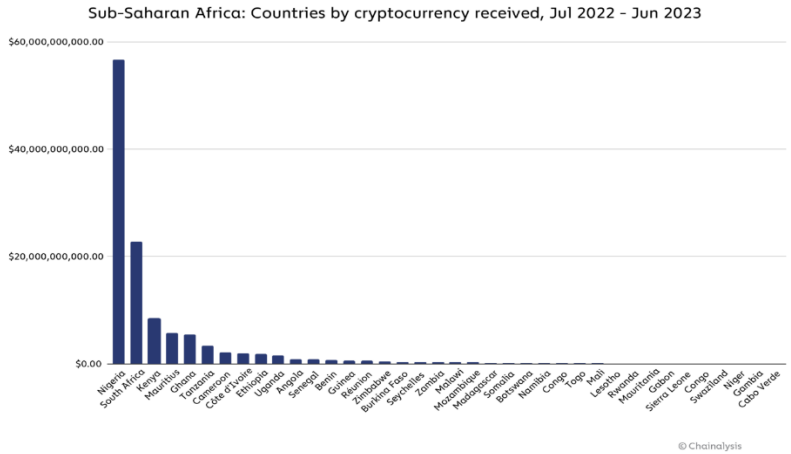
Despite the ban imposed by the CBN, Nigeria has surprisingly emerged as a major player in the cryptocurrency space, adopting and launching cryptocurrencies despite regulatory and other obstacles. The country has witnessed a surge in cryptocurrency transactions, with more and more Nigerians participating in cryptocurrency trading, investing, and remittances. Cryptocurrencies are commonly traded on cryptocurrency exchanges in Nigeria, and peer-to-peer (P2P) trading is increasing in popularity (Greenfield, 2023). P2P trading allows individuals to exchange cryptocurrencies directly with each other, bypassing the traditional banking sector. Additionally, Nigeria has witnessed the proliferation of cryptocurrency exchanges and trading platforms that provide individuals with convenient access to buy, sell, and trade cryptocurrencies. Platforms such as Local Bitcoins and Paxful have played a crucial role in driving the growth of the cryptocurrency market in Nigeria and contributed to increased awareness and adoption of such currencies. Figure 3.4 shows the private sector players already exploring blockchain technology in five (5) broad clusters, with a focus on the payments and cryptocurrency exchanges cluster.

Figure 4.1 Private Sector Players Exploring Blockchain Technology

Source: https://www.efina.org.ng/wp-content/uploads/2021/04/Full-EFInA-Report-Potential-of-Blockchain-for-Financial-Inclusion-in-Nigeria-1.pdf

As cryptocurrency adoption continues to gain momentum, Nigeria is at the forefront of this global phenomenon. It is estimated that there are 12.86 million cryptocurrency owners in Nigeria, which represents about 5.75% of the country's population (Greenfield, 2023). Nigeria ranks first in Sub-Saharan Africa and second in the world in terms of cryptocurrency adoption and transaction volume in the Global Crypto Adoption Index. Chart 4.1 illustrates Nigeria's position compared to other countries in sub-Saharan Africa [Greenfield: 2023].

Chart 4.1: Sub-Saharan Africa: Countries by Cryptocurrency received, Jul 2022 – Jun 2023

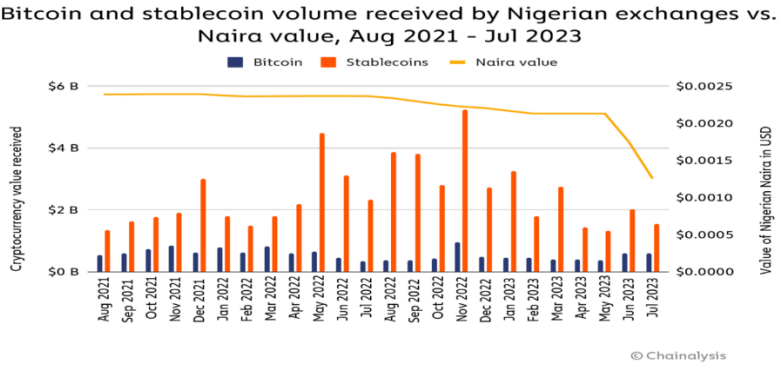


https://www.chainalysis.com/blog/africa-cryptocurrency-adoption/

Nigeria, the largest country in sub-Saharan Africa with a significant population and economy, occupies a prominent position in the cryptocurrency market. Despite market fluctuations, Nigeria's crypto economy continues to thrive. According to a study conducted by chainalysis.com, Nigeria is among the top 50 countries worldwide in terms of crypto transaction volume. With a growth rate of 9.0%, Nigeria ranks third among the six nations in this category (Chainalysis.com, 2023).

Several factors have contributed to the widespread adoption of cryptocurrencies in Nigeria as an alternative solution to the country's economic challenges. These factors include two major recessions since 2016, the impact of the COVID-19 pandemic, and the decline in oil prices due to political instability. In addition, the recent redesign of the Naira currency has resulted in a shortage of cash, placing significant pressure on the unbanked population, and creating uncertainty over the use of old banknotes. All of this happened during an election period and amid a record-high inflation rate of over 20% at the start of 2023. The uncertain economic climate in Nigeria has led many citizens to seek financial alternatives, increasing the appeal of cryptocurrencies as a viable solution (Chainalysis.com, 2023). Figure 4.2 shows that interest in Bitcoin and stablecoins has increased as the value of the Naira has fallen, particularly during the recent extremely sharp declines in June and July 2023.

Chart 4.2: Bitcoin and Stablecoin Volume Received by Nigerian Exchanges Vs Naira Value, Aug 2021 – Jul 2023



Source: https://www.chainalysis.com/blog/africa-cryptocurrency-adoption/

The significant increase in cryptocurrency activity observed in May and November 2022 was due to users taking advantage of the volatility caused by the collapses of TerraLuna and FTX. These events provided traders with the opportunity to make speculative trades. It is important to note that these spikes in activity are due to external factors rather than the local economic situation in Nigeria. Additionally, there is growing interest across the region in altcoins, which are alternative cryptocurrencies to Bitcoin. This shows a diversification of investment preferences among cryptocurrency users in Nigeria and neighbouring countries (Chainalysis.com, 2023).

Aside from its large population, Nigeria's prominence in the cryptocurrency space is also due to its dynamic and tech-savvy youth. The Nigerian population has shown great interest in exploring the potential benefits of cryptocurrencies, including secure and efficient cross-border transactions, financial inclusion, and investment opportunities. Nigeria's economic landscape, characterised by a significant remittance market and limited access to traditional financial services, has created an environment conducive to cryptocurrency adoption. By using cryptocurrencies, some Nigerians now conduct financial transactions and access financial services while bypassing the limitations of traditional banking systems. However, Nigeria's position in cryptocurrency is not without its challenges. The decentralised and unregulated nature of cryptocurrencies has raised concerns about consumer protection, fraud, and money laundering. Like many other countries, the Nigerian government has raised concerns about the possible misuse of cryptocurrencies for illegal activities. In response, the Nigerian government, in line with countries such as China, Russia, and Türkiye, introduced strict regulations to restrict or even ban trading in volatile digital currencies such as Bitcoin (Salako, 2021).

The Nigerian government and regulators have recognised the need for comprehensive regulation and have developed frameworks that address these concerns and

ensure the safe integration of cryptocurrencies into the Nigerian financial system. In May 2022, the Securities and Exchange Commission (SEC) of Nigeria published a document titled "New Rules for Issuance, Offering Platforms, and Custody of Digital Assets." These regulations provide guidelines for digital asset service providers and define digital assets and digital asset exchanges (DAXs). Crypto exchanges operating in Nigeria must now obtain approval and meet various requirements, including minimum deposit capital and risk management measures. There are currently no specific cryptocurrency tax laws in Nigeria. However, the Federal Inland Revenue Service has stated that cryptocurrency transactions are taxable as capital gains. Furthermore, the government plans to introduce taxation on cryptocurrencies and digital assets in the future until the proposed finance bill is approved (Salako, 2021).

Several studies and reports have underscored the increasing interest and awareness of Nigerians in cryptocurrencies. These findings highlight the following key points:

High Level of Cryptocurrency Awareness: Research shows that Nigeria is leading Africa in terms of cryptocurrency awareness and adoption. The Nigerian population, particularly the tech-savvy and younger demographic, has shown great interest in cryptocurrencies, particularly Bitcoin. According to a

report by Chainalysis, crypto adoption in Nigeria recorded an annual growth rate of 9% between July 2022 and June 2023, with trading volume reaching $56.7 billion (Partner, 2023). This data suggests a significant increase in cryptocurrency activity in the country. Another research report by Consensys found that a staggering 99% of Nigerians surveyed showed cryptocurrency awareness, indicating exceptionally high cryptocurrency awareness (Digifinex, 2023). Additionally, 70% of respondents demonstrated a clear understanding of blockchain technology, further highlighting their knowledge and interest in the underlying technology that supports cryptocurrencies. Furthermore, 65% of respondents viewed cryptocurrencies as a valuable tool to hedge against financial recession and hyperinflation, showing Nigerians' trust in cryptocurrencies to hedge against economic challenges.

Remittances and Financial Inclusion: The increasing popularity of cryptocurrencies in Nigeria can be attributed to their potential to facilitate cross-border remittances and meet the financial needs of the unbanked and underbanked population. Cryptocurrencies represent an alternative to traditional banking systems and offer advantages such as faster and cheaper transfers. Compared to the traditional methods of sending remittances to Nigeria, which involve high fees and long processing times, cryptocurrencies such as Bitcoin have gained traction as a preferred option. According to the

Chainalysis 2022 Crypto Index Report, Africa currently receives $49 billion in remittances globally, and the use of cryptocurrencies for remittances is increasing (Partner, 2023). In 2022, sub-Saharan Africa witnessed a significant increase in on-chain cryptocurrency volume to $100 billion, which was 16% more than the previous year (Chainalysis, 2022). Given the current naira redesign issues, cryptocurrency adoption for remittances is expected to continue to grow in 2024. In particular, the introduction of the Send Global feature by the U.S.-based Bitcoin company Strike in collaboration with Bitnob, a Nigerian Bitcoin company, has further facilitated quick transfers from the U.S. to Africa and contributed to the attractiveness of cryptocurrencies (Khalil, 2023). The accessibility and efficiency of cryptocurrencies make them an attractive option for individuals seeking financial inclusion and faster cross-border transactions.

According to a World Bank report, a considerable proportion of Africa's adult population, over 55%, is expected to be unbanked in 2021 (Global Finance:2021). This lack of access to formal financial services is also widespread in Nigeria, where the unbanked population relies heavily on cash for their transactions and wealth preservation. The recent rebalancing of the naira has had a negative impact on the unbanked population, exacerbating their challenges. In this context, Bitcoin appears as an alternative medium that not only protects the economic sovereignty of individuals but also gives

them access to a global monetary network. Table 4.1 below further supports this perspective and shows that even with an internet penetration rate of 70%, 60% of the Nigerian population is still unbanked. This data highlights the fertile ground for alternative systems such as cryptocurrencies in Nigeria and offers a potential solution for financial inclusion (Global Finance, 2021).

Table 4.1 World's Most Unbanked Countries

World's Most Unbanked Countries						
Country	**Total Population (Millions)**	**Unbanked Population (%)**	**Cash Transactions (%)**	**Card Transactions (%)**	**# Of ATMs Per 100,000 Adults**	**Internet Penetration (%)**
Morocco	36.9	71	41	27	28.6	62
Vietnam	97.3	69	26	35	25.9	66
Egypt	102.3	67	55	27	20.1	45
Philippines	109.6	66	37	22	29.0	60
Mexico	128.9	63	21	44	61.5	66
Nigeria	206.1	60	24	27	16.9	70
Peru	33.0	57	22	62	126.7	49
Colombia	50.9	54	15	55	41.3	62

Source: Source: Global Finance and Merchant Machine, 2021 https://gfmag.com/data/worlds-most-unbanked-countries/

- Cryptocurrency Education and Awareness Programs: In Nigeria, various organizations and communities have taken proactive measures to promote cryptocurrency education and raise awareness among the population. These initiatives include organizing seminars, training programmes

and workshops aimed at educating individuals about the basic principles of cryptocurrencies and the underlying blockchain technology. One such example is the Quidax Academy course offered by Quidax, a cryptocurrency exchange platform. The course was designed to provide novice investors with the knowledge they need to begin their cryptocurrency journey and navigate the market effectively. By providing education, these initiatives help individuals reduce the risk of falling victim to scams and fraudulent activities in the cryptocurrency space (Partner, 2023). Bekonta, a Nigerian fintech startup, is another organization that is actively promoting cryptocurrency awareness and is committed to better-educating users in Nigeria. The company aims to provide Nigerians with a better understanding of the blockchain ecosystem so that they can capitalize on the opportunities presented by the age of wealth transfer. Through their automated platform, Nigerians can easily purchase tokens such as Ethereum, BNB, USDT, Tron, and more, allowing them to explore the world of cryptocurrencies and potentially generate wealth (Techpoint.africa, 2022). Additionally, the stakeholders of the Blockchain Technology Association of Nigeria (SIBAN) organized the Digital Assets Summit in Abuja, Nigeria. This summit featured panel

discussions focused on Web3 education and capacity building, addressing the existing awareness of Blockchain and Web3 technologies in the country and the challenges associated with them. One of the major challenges highlighted during the discussions was the language barrier arising from Nigeria's linguistic diversity, which is a barrier to effective blockchain education (Nwaokocha, 2023). These education and awareness initiatives play a crucial role in promoting a better understanding of cryptocurrencies and blockchain technology among Nigerians.

Nigeria has emerged as a major player in the global cryptocurrency landscape, benefiting from its tech-savvy population, burgeoning cryptocurrency market, and recognition of the potential benefits that digital currencies offer. The country has positioned itself to shape the future of cryptocurrencies not only in Africa but also on a global scale. However, the Nigerian government and regulators must strike a delicate balance between encouraging innovation and ensuring the protection of investors and consumers in this rapidly evolving area.

Additionally, the Nigerian government has taken a notable step by adopting a national blockchain policy as part of its efforts to transition to a digital economy. This policy aims

to establish a blockchain-based economy that enables secure transactions, data sharing, and value exchange between individuals, businesses, and the government. Additionally, the government has directed regulators such as the Central Bank of Nigeria and the Securities and Exchange Commission (SEC) to develop regulatory tools to facilitate the implementation of blockchain technology in various economic sectors (Greenfield, 2023). This move underscores the Nigerian government's commitment to embrace blockchain technology and realise its potential to drive economic growth and innovation in the country.

5.0 FUTURE OF FINANCE

When viewed through the prism of blockchain technology and cryptocurrencies, the future of finance is undergoing a profound transformation that is upending long-standing financial institutions. Bitcoin and other alternative cryptocurrencies, such as Ethereum, are gaining importance and changing the way we understand and deal with money. The underlying blockchain technology that forms the foundation of cryptocurrencies is revolutionising financial operations by enabling secure, transparent, and decentralised transactions. The convergence of cryptocurrencies and blockchain technology holds enormous potential to revolutionise the financial landscape, impacting areas such as banking and payment systems, lending, investing, and beyond.

However, this future also brings with it several challenges, including the need to create appropriate legal frameworks, address safety concerns, and address ethical and environmental considerations. A thorough examination of these pertinent issues is necessary to uncover this future development. Therefore, to fully understand the impact of cryptocurrencies and blockchain technology on the future of finance, it is essential to carefully examine the diverse opportunities and challenges they pose.

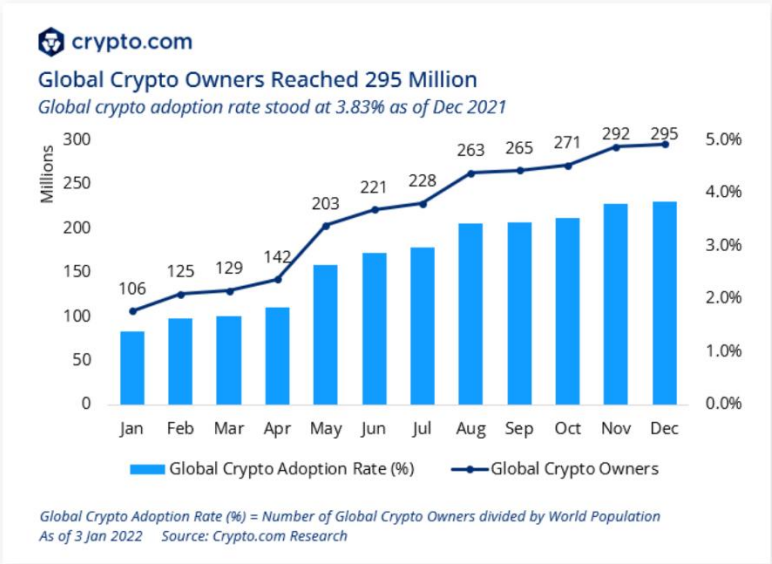
5.1. Cryptocurrency Adoption

The recent surge in the value and appeal of cryptocurrencies has pushed their widespread use to unprecedented levels. It is important to remember that despite the increase, global cryptocurrency ownership is still exceptionally low, and some countries are setting the standard. According to Baltrusaitis (2022), as the use of cryptocurrencies increased, they became increasingly integrated into people's daily lives and took over some of the roles that traditional monetary systems once had. The emergence of new digital currencies and the widespread use of cryptocurrencies, including well-known ones such as Bitcoin and Ethereum, have had a significant impact on the current financial situation and will certainly continue to have an impact in the future. These impacts include the creation of legal frameworks to control the use of cryptocurrencies, their integration into

mainstream financial systems, and their potential disruption to established banking and payment systems. As a result, the increasing adoption of cryptocurrencies has triggered a paradigm shift in the financial industry, requiring in-depth analysis of their integration into current financial systems, regulatory issues, and impact on the economy.

According to Crypto.com, the global cryptocurrency adoption rate in 2021 was 3.83%, with a total of 295 million crypto owners (see Figure 5.1). Although this number is still relatively small, it is notable given the early stages of crypto development. The number of crypto owners is predicted to reach one billion by the end of 2022, indicating a significant increase in adoption. The first half of 2021, in particular, saw a notable surge in crypto adoption, with influential institutions such as Tesla and Mastercard making moves to adopt cryptocurrencies. This trend of sustained growth in cryptocurrency adoption continued throughout 2021.

Chart 5.1 Number of Global Crypto Owners by December 2021



Although the number of merchants accepting cryptocurrencies is steadily increasing, they still represent a minority. For cryptocurrencies to achieve wider acceptance, widespread consumer adoption is crucial. However, the relative complexity of cryptocurrencies compared to traditional currencies is likely to deter most people unless they have technical knowledge.

In terms of country adoption, Tuwiner (2023) reports that the crypto ownership rate in the United States is 17% as of September 10, 2023. Previous statistics show that the crypto ownership rate in the United States was

lower at 13%. This rate is also lower than the global crypto ownership rate, which stands at 15%. Among other countries, India leads with an ownership rate of 29%, followed by Nigeria at 27%, while Germany lags with an ownership rate of just 6%. Table 5.1 provides a comprehensive overview of ownership rates in different countries.

Table 5.1 Crypto Adoption Rate by Countries

Country	Adoption Rate
India	29%
Nigeria	27%
Vietnam	25%
Australia	22%
Ghana	20%
Singapore	20%
Hong Kong	18%
Venezuela	18%
Brazil	17%
Indonesia	16%
Philippines	16%
Colombia	15%
Kenya	15%
Malaysia	15%
United States	17%
Argentina	13%
Mexico	13%

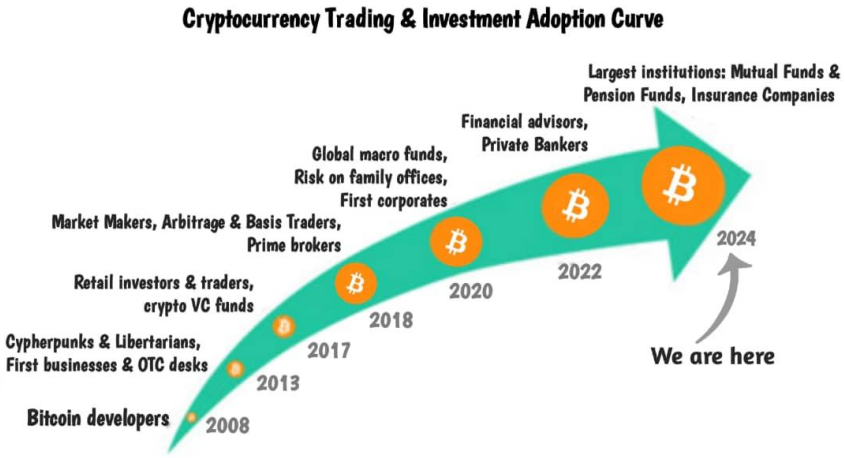
Canada	10%
Ireland	10%
South Africa	10%

Source : https://buybitcoinworldwide.com/crypto-adoption-index-statistics/

Legal restrictions on the ownership and use of cryptocurrencies are limited to just 3% of countries worldwide, with another 3% considering them completely illegal. According to Finbold, internet users in Thailand, Nigeria, the Philippines, South Africa, and Türkiye have the highest prevalence of cryptocurrency ownership, with 18 to 20% of their internet users owning cryptocurrencies.

The trajectory of cryptocurrency trading and investment adoption has evolved since its early days in 2008, when Bitcoin developers primarily adopted it. Starting in 2022, financial advisors and private bankers will join the adoption race. Despite some fluctuations, the overall trend in 2022 was upward, with traditional financial institutions offering a range of crypto services, including lending, trading, and custody. Institutional players have also recognised the emergence of decentralised finance (DeFi) and non-fungible tokens (NFTs), particularly venture capital firms and specialized funds that are actively seeking new investment opportunities. Figure 5.1 shows the cryptocurrency trading and investment adoption curve.

Figure 5.1 Cryptocurrency Trading & Investment Adoption Curve



The year 2023 saw a significant influx of large institutions and investors into the crypto industry, cementing its status as a mainstream phenomenon. Despite the challenges during the "crypto winter" of 2022, there was a notable 5% increase in development in the crypto sector, highlighting the continued interest in the underlying technology. Additionally, a survey conducted by Celent in 2022 found that a remarkable 91% of institutional investors expressed strong interest in investing in tokenized assets, further highlighting the strong demand for such assets (Kaur, 2023). This amply shows the promising global outlook for blockchain technology and cryptocurrencies.

5.2. Decentralised Finance (DeFi)

The rapid development of the world is changing the concept of "trust" and its management, especially in the field of fiat currency. Blockchain technology has facilitated the emergence of decentralised finance (DeFi), which can be understood as the democratization of money. Simply put, DeFi allows individuals to collectively agree on the value of electronically generated and issued assets. This conferred value comes from the crucial element of trust.

Decentralized finance, or DeFi, is a subset of alternative finance where different financial transactions are carried out via public blockchain technology. Enabling a strong substitute for the centralized middleman-focused approach of the previous system is the primary objective of DeFi. Its mission is to provide accessible, inclusive, and permissionless financial services to individuals worldwide. In recent years, DeFi has attracted significant attention due to its potential to address the limitations and inequalities of the current financial infrastructure. It has the power to reshape traditional financial intermediaries by offering innovative lending, borrowing, and investing solutions. These solutions improve accessibility, transparency, and efficiency in financial transactions. However, DeFi also presents challenges in terms of security, regulation, and potential financial risks.

As previously mentioned, the conventional financial system has limitations that hinder growth and contribute to inequality. For example, approximately 1.7 billion people worldwide lack access to banking services, and small businesses struggle to obtain affordable financing, resulting in lower investment and economic growth. In addition, the prohibitive costs associated with traditional banking systems, such as credit card fees, impact both businesses and consumers (Harvey, Ramachandran, and Santoro, 2012). Therefore, DeFi poses a challenge to the existing financial system by offering alternative solutions. By leveraging blockchain technology and decentralised methods, DeFi has the potential to redefine the future of finance. The aim is to provide financial services that are more accessible, efficient, and cost-effective (Harvey, Ramachandran, and Santoro, 2012).

DeFi relies on blockchain technology, with Ethereum being a prominent example. Through smart contracts, which are self-executing contracts with predefined rules, financial transactions can be automated, eliminating the need for intermediaries. This technology enables faster, cheaper, and more secure transactions (Klein, 2023). DeFi also encompasses a wide range of applications, including flash loans, flash swaps, automated market makers, cryptocurrency lending and borrowing, decentralised exchanges, and yield farming. These applications offer individuals the opportunity to engage in financial

activities that were previously only available to traditional financial institutions (Harvey, Ramachandran, and Santoro, 2012). Additionally, DeFi enables the tokenization of assets such as stocks, collectibles, and real estate, enabling fractional ownership and increased liquidity. This opens new investment opportunities and reduces barriers to entry for people previously excluded from such markets (Klein, 2023).

According to Statisca.com (2023), the growth of the DeFi market is driven by several factors. This includes the increasing demand for decentralised financial services, which are more accessible, transparent, and inclusive compared to traditional finance. In addition, the flexibility and programmability of blockchain technology enable the creation of new financial instruments and services that were previously unimaginable. The availability of decentralised lending, borrowing, and trading platforms is also contributing to the growth of DeFi, allowing users to interact with financial markets in a decentralised and permissionless manner. Looking ahead, the DeFi market is expected to continue to grow. Factors driving this growth include the continued development of new DeFi use cases and applications, the increasing adoption of cryptocurrencies by mainstream investors, and the emergence of new DeFi platforms and protocols. However, certain challenges need to be addressed, such as regulatory frameworks, investor protection, anti-money laundering (AML) compliance, and

the potential for market manipulation. The future of DeFi will depend on successfully addressing and resolving these challenges (Klein, 2023).

5.3. Central Bank Digital Currencies (CBDCs)

Governments and central banks are actively exploring the development and implementation of central bank digital currencies (CBDCs) as well as the integration of decentralised finance (DeFi) into the traditional financial system. CBDCs are digital forms of fiat currencies issued and regulated by central authorities and aim to combine the benefits of cryptocurrencies, such as faster transactions and greater financial inclusion, with maintaining control over monetary policy. The introduction of CBDCs is changing the financial landscape and impacting traditional banking systems. As of October 2021, of the 87 countries that have expressed interest in developing their central bank digital currency (CBDC), only seven countries have successfully launched their CBDCs. Notably, Nigeria is the only pan-African country to achieve this feat (see Figure 5.2). Additionally, it is important to note that sixteen (16) additional countries are currently in various stages of pilot testing as they prepare for the full launch of their CBDCs in the near future. These countries are actively working to implement their CBDC initiatives and are undergoing rigorous testing to ensure a smooth and successful launch.

Fig. 5.2: Fully Launched CBDC Countries

Source:https://www.researchgate.net/publication/362577503_Cryptocurrency_and_Global_Practices_Lessons_for_Nigeria

CBDCs have the potential to significantly impact the future of finance in several ways. First, they can improve financial inclusion by providing a risk-free and widely accepted form of digital money that is accessible to a larger population (Adrian, He, Mancini-Griffoli, & Sun, 2023). Recent survey data shows a global trend towards preferring electronic payments over cash, with over 70% of respondents from various countries expressing a desire to pay cashless (Adrian, He, Mancini-Griffoli, & Sun, 2023). By issuing digital fiat currencies on distributed ledgers, central banks aim to maintain sovereign control over money given the increasing use of

cryptocurrencies (Mazzucco, 2022). Additionally, CBDCs have the potential to promote financial inclusion, streamline domestic and cross-border payments, and enable real-time money transfers (Al-Sabah, 2021). According to Bhatia (2023), CBDCs can provide faster and cheaper payment options compared to traditional banking systems, resulting in cost savings for individuals and businesses, as well as reducing settlement risk and delays in international trade.

However, due to numerous factors, the introduction of CBDCs can be a gradual process. These include the need for political support, building a robust technological infrastructure, and addressing security and privacy concerns. Incremental technological improvements are preferred over the rapid transformation of the payment infrastructure (Adrian, He, Mancini-Griffoli, and Sun, 2023). The International Monetary Fund (IMF) has recognised the potential of CBDCs to replace cash, particularly in island economies where cash distribution is costly, as well as in advanced economies where CBDCs can provide resilience. CBDCs can also help improve financial inclusion in areas where a sizeable portion of the population is unbanked (Chiang, 2023).

Despite the potential benefits, there are security, privacy, and governance concerns surrounding CBDCs. The centralization of sensitive financial information and its accessibility to the government raise privacy concerns. In

addition, the risk of cyberattacks and the concentration of wealth and power are factors that must be carefully considered. The introduction of CBDCs poses risks for commercial banks, as their deposits currently finance a significant portion of the money supply. The widespread adoption of CBDCs could potentially disrupt traditional lenders and require a reassessment of transmission mechanisms such as interest rates (Nofer et al., 2021). Technical challenges also include securing large-scale payment networks from quantum computer attacks and ensuring privacy while complying with anti-money laundering/Know Your Customer (AML/KYC) regulations (Bloomfield, 2021). Furthermore, the impact of CBDCs on monetary sovereignty and the stability of reserve currencies remains a topic of debate (Lastra & Allen, 2021). Overall, CBDCs represent attempts to combine the benefits of blockchain technology with central bank oversight, and their long-term impact on the financial system depends on answering various open questions related to technology, policy, and the setting of coordination standards (Mazzucco, 2022).

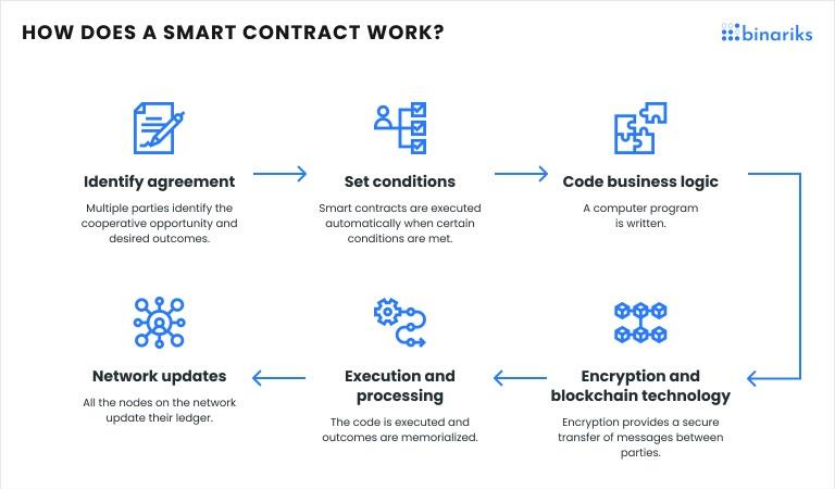
5.4. Smart Contracts and Automation

By optimising digital interactions and automating complex financial processes, smart contracts are completely changing the financial landscape. Compared to typical contracts, they offer many advantages, such as self-execution, programmability, immutability, and

trustlessness. The terms and conditions set out in its code are automatically enforced through these self-executing contracts. Smart contracts can use blockchain technology to automate and accelerate various financial operations, including supply chain management, insurance claims, and trade settlements. This can lead to lower costs and the elimination of intermediaries.

According to Musharraf (2023), smart contracts are pieces of code that reside on a blockchain and execute predefined actions when specific conditions are met. Importantly, these actions are executed automatically without the need for human intervention. Additionally, smart contracts operate transparently, with their actions immutably recorded on the blockchain. Figure 5.2, presented by Binariks (2023), illustrates how a smart contract works. It starts with identifying the agreement, followed by setting conditions and entering the code. Subsequent activities include encryption and blockchain technology, execution and processing, and network updates. In the future, the combination of smart contracts and artificial intelligence will further improve the seamless automatic execution of processes.

Figure 5.2 How Does a Smart Contract Work?



Source: https://binariks.com/blog/smart-contracts-blockchain-examples/

5.5. Data Privacy and Security

The advent of cryptocurrencies and blockchain technology has raised concerns about data security and privacy. The decentralised nature of blockchain technology and the anonymity of cryptocurrencies present challenges in ensuring the security and privacy of financial transactions. It is important to understand the potential impact of these technologies on data security and privacy, as well as their impact on the future of finance. As financial transactions occur more often over blockchain networks, protecting privacy and security becomes increasingly important.

As amply demonstrated, the decentralized and immutable nature of blockchain technology enhances the security of financial transactions. However, there are still issues to be addressed, such as protecting user identities, preventing hacker attacks, and resolving privacy issues on public blockchain networks. Given these difficulties, it is important to develop strong procedures and protocols for blockchain technology to ensure data availability, confidentiality, and integrity.

As blockchain offers pseudonymity—a mechanism where people are identified by cryptographic addresses rather than their true identities—data linking, and analysis could put privacy at risk. Blockchain transactions can be problematic for people who value financial privacy because they make the flow of money and the parties involved traceable to the public.

To address these concerns, various privacy-focused solutions have been proposed. Zero-knowledge proofs (ZKPs) have emerged as a common method for ensuring privacy on public blockchain networks. ZKPs allow one party to cryptographically prove to another party that they have knowledge of specific information without revealing the underlying information itself (Chainlink, 2021). This protects privacy by proving the validity of hidden information without revealing it. ZKP protocols have been implemented in cryptocurrencies such as Zerocoin and Zcash to improve privacy (Swan, 2015).

Additionally, the concept of zero trust, which assumes that every person and device could pose a potential threat, can be applied to improve security. Zero-knowledge proofs can be used as part of a zero-trust framework and enable authentication without disclosing personal information (Chainlink, 2021).

When it comes to data security, the decentralised nature of blockchain offers inherent advantages. Cryptographic techniques ensure the integrity and immutability of transactions recorded on the blockchain. Distributed consensus mechanisms such as proof-of-work or proof-of-stake further improve network security by requiring a majority of participants to agree on the validity of the transaction. However, it is important to recognise that blockchain technology is not immune to security breaches. Although the underlying cryptographic algorithms are robust, vulnerabilities can arise due to implementation errors, smart contract errors, or attacks on the network consensus mechanism. The security of individual cryptocurrency wallets and exchanges also remains a concern, as they have been the target of hacking incidents (Mougayar, 2016).

Looking forward, the intersection of cryptocurrency and blockchain within the finance landscape will be about finding a balance between privacy and regulatory requirements. Governments and regulators are increasingly focused on creating frameworks to address

the risks associated with cryptocurrencies, such as money laundering and terrorist financing. This has led to the introduction of Know Your Customer (KYC) and Anti-Money Laundering (AML) regulations in many countries.

5.6. Regulatory Challenges

The rapid growth of cryptocurrencies and blockchain technology poses regulatory challenges for governments worldwide. Policymakers are grappling with issues such as defining the legal status of cryptocurrencies, setting guidelines for initial coin offerings (ICOs), combating money laundering and illegal activities, and striking a balance between innovation and consumer protection.

The regulatory environment surrounding cryptocurrencies and blockchain technologies continues to evolve as these novel systems bring new challenges and opportunities. Table 5.2 below shows the different regulatory approaches in some selected countries.

Table 5.2: Selected Countries with their Crypto Regulatory Environment

Countries	Regulatory Environment
United States	The U.S. has taken steps towards regulating cryptocurrencies and blockchain technologies. The Securities and Exchange Commission (SEC) and the Commodity Futures Trading Commission (CFTC) have been given regulatory power in this area. The U.S. is exploring the potential for a central bank digital currency (CBDC) or a digital form of the U.S. dollar.
China	China has taken a strict approach to cryptocurrencies. It classifies them as property and has banned crypto exchanges and mining activities. It has, however, been developing its own central bank digital currency (CBDC), known as the digital yuan
Canada	Canada has been proactive in regulating cryptocurrencies. It became the first country to approve a Bitcoin exchange-traded fund (ETF) and requires crypto trading platforms and dealers to register with provincial regulators.
United Kingdom	While there are no specific cryptocurrency laws in the UK, cryptocurrencies are considered property and crypto exchanges must register with the Financial Conduct Authority (FCA).

Japan:	Japan has a progressive approach to crypto regulation. Cryptocurrencies are recognised as legal property, and crypto exchanges must register with the Financial Services Agency (FSA).
Australia	Australia classifies cryptocurrencies as legal property and subjects them to capital gains tax. Exchanges must register with the Australian Transaction Reports and Analysis Centre (AUSTRAC).
Singapore:	Singapore classifies cryptocurrencies as property but not legal tender. The Monetary Authority of Singapore (MAS) licenses and regulates exchanges.
South Korea:	South Korea requires cryptocurrency exchanges and virtual asset service providers to register with the Korea Financial Intelligence Unit (KFIU). Privacy coins are banned, and the government has plans to introduce a tax on digital assets.
India:	India has not yet legalized or penalized the use of cryptocurrencies. There is a bill in circulation that prohibits private cryptocurrencies, and there are taxes imposed on crypto investments and trades.
Brazil	Brazil has legalized cryptocurrencies as a means of payment throughout the country. The Brazilian Central Bank is responsible for regulating and supervising crypto exchanges.
European Union:	Cryptocurrencies are legal throughout most of the European Union, but exchange governance and taxation vary by country.

Nigeria	Cryptocurrencies are not recognised as legal tender by the Central Bank of Nigeria (CBN). The CBN banned commercial banks in Nigeria from engaging in any cryptocurrency transactions in February 2021. However, cryptocurrencies are not illegal in Nigeria, and there are no specific laws or provisions criminalizing their use. Cryptocurrencies are widely traded on cryptocurrency exchanges in Nigeria, and peer-to-peer trading is popular. The Securities and Exchange Commission (SEC) of Nigeria has taken on the task of framing crypto regulation in the country.

Sources:
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Initially, regulatory approaches to cryptocurrencies ranged from outright bans to laissez-faire. However, most regulators now adopt a balanced approach and aim for proportionate supervision that balances risk and innovation. Regulators have raised concerns about cryptocurrencies' potential to facilitate money laundering and mask criminal transactions and illegal activities if left unregulated. Cybercriminals have also targeted cryptocurrency users through fraudulent activities, such as heists on exchange platforms. Additionally, consumers face risks when interacting with unregulated crypto trading venues, as there may be limited recourse in the event of bankruptcy or manipulation. Governments are addressing these issues by crafting regulations focused on Know-Your-Customer (KYC) checks, transaction monitoring, and other anti-money laundering protocols for crypto companies. The aim is to protect investors and establish regulatory sandboxes that promote innovation in a safe environment.

However, overzealous policies in various countries may hamper grassroots innovation in the cryptocurrency and blockchain spaces, especially when it comes to financial inclusion. These policies, often based on concerns about security, regulation, and control, can create barriers for individuals and small businesses seeking to participate in the cryptocurrency and blockchain industries. The high regulatory burdens on cryptocurrency and blockchain startups can make it difficult for them to meet complex

and costly requirements, hindering innovation and limiting market entry (Nault, 2021).

Unclear or ambiguous regulations can also create uncertainty and discourage entrepreneurs from pursuing innovative ideas in the cryptocurrency and blockchain spaces. Without clear guidelines, startups may be reluctant to invest resources in developing innovative solutions. Additionally, policies that limit access to traditional banking services for cryptocurrency and blockchain startups may impact their ability to raise funds, process payments, and operate effectively, thereby limiting financial inclusion, as is the case in Nigeria. These restrictive policies not only lead to a brain drain but also hinder potential economic benefits for countries and stifle experimentation and exploration of new use cases for blockchain technology. This stifles creativity and limits the potential for grassroots innovations that could address real-world challenges, including financial inclusion. Many argue that regulations should avoid hindering responsible experimentation through technology-neutral and proportionate rules.

5.7. Ethical and Environmental Considerations

Cryptocurrencies and blockchain technology have revolutionised the financial industry, but it is essential to find a balance between innovation and responsibility to harness their potential to improve the financial system. As cryptocurrencies and blockchain technology become an

integral part of the future of finance, considering ethical and environmental considerations will become crucial to ensuring sustainable and responsible financial systems. The following ethical and environmental considerations are of utmost importance:

Ethical Considerations: The decentralised nature of cryptocurrencies has led to a lack of trust, hindering their mainstream adoption as a reliable form of currency. Due to the pseudonymisation of users, cryptocurrencies are associated with criminal activities such as financing terrorism and illegal businesses. Additionally, the speculative nature of the cryptocurrency market has created addiction problems, especially among young investors. Promoting responsible investment models and financial education is crucial to mitigating these problems. Additionally, the lack of comprehensive regulation in the cryptocurrency market leaves investors vulnerable and without recourse. By introducing national and supranational regulations, criminal activities can be prevented, investors can be protected, and systemic risks in the financial system can be eliminated. Addressing ethical complexity requires collaborative efforts from technologists, policymakers, and researchers committed to maximizing the benefits of blockchain equitably and sustainably (Berg et al., 2020).

Environmental Considerations: The blockchain technology that underlies cryptocurrencies consumes a significant

amount of energy. The energy-intensive process of mining cryptocurrencies, especially Bitcoin, has harmful effects on the environment. It is crucial to explore more energy-efficient consensus protocols to reduce the environmental footprint of blockchain technology. In addition, cryptocurrency mining generates significant e-waste, especially as dedicated mining hardware quickly becomes obsolete. This waste contributes to environmental destruction and requires right measures to address it (Reiff:2022).

The energy and computing resources needed to operate cryptocurrency mining networks raise concerns about energy consumption and environmental impact. Proof-of-work protocols like Bitcoin require energy-intensive distributed computation to secure networks and produce new coins, estimated to consume over one hundred terawatt-hours per year, comparable to that of medium-sized countries (digiconomist.net). Some argue that this represents a waste of resources, while proponents claim that it effectively secures the blockchain (Hileman & Rauchs, 2017). This source of concern may have implications for the future of cryptocurrencies and blockchain, as well as finance in general.

6.0 CONCLUSION AND WAY FORWARD

6.1 Conclusion

In conclusion, embracing the digital revolution, which includes cryptocurrencies and blockchain technology, offers enormous potential to reshape the future of finance in both the global economy and Nigeria. We are on the precipice of an era that has the potential to transform the financial landscape. The emergence of cryptocurrencies and blockchain technology will revolutionise transactions, facilitate secure data exchange, and improve wealth management practices. As the world navigates through the complexities of this digital revolution, it is essential to approach the challenges thoughtfully, develop solutions that benefit everyone involved, and imagine a future where innovation and ethical considerations coexist harmoniously. By embracing this wave of transformation, the shape of the financial landscape will be inclusive, efficient, and ethically sound.

6.2 Way Forward

To move forward, global collaboration, knowledge sharing, and interdisciplinary collaboration should be encouraged. Ongoing research, education, and awareness programmes will help stakeholders adapt to the rapidly evolving digital landscape and ensure the responsible and sustainable integration of cryptocurrency and blockchain technology

into the future of finance. Different countries should prioritise regulatory frameworks, financial literacy, blockchain applications, inter-sector collaboration, cybersecurity measures, and international engagement to maximize the potential of cryptocurrency and blockchain technology for their financial systems and overall developments.

Way Forward for the Global Community

The digital revolution, characterised by cryptocurrency and blockchain technology, has the potential to reshape the future of finance on a global scale. These innovative technologies offer transformative opportunities for financial systems and institutions worldwide. However, it is critical to address several key considerations to ensure a sustainable and inclusive future.

- The adoption of cryptocurrencies should be accompanied by comprehensive regulatory frameworks that protect users' interests, promote transparency, and mitigate potential risks such as money laundering and fraud. Governments and regulators must work together to establish clear guidelines and standards to promote trust and stability in the cryptocurrency ecosystem. Governments should enact laws that specifically address cryptocurrencies and clearly define their legal status, rights, and responsibilities to address varied models in different countries. This includes clarifying the classification of

cryptocurrencies as assets, currencies, or securities and determining the scope of regulatory oversight. Governments should also regulate the strict implementation of Know Your Customer (KYC) and Anti-Money Laundering (AML) measures. Cryptocurrency exchanges and service providers should be required to implement strict KYC procedures to verify the identity of their users. While this contradicts Satoshi Nakamoto's original idea, a hybrid model takes care of some threats that have been identified. Adequate anti-money laundering measures should also be in place to prevent illegal activities such as money laundering and terrorist financing. Cryptocurrency exchanges and other service providers should be required to obtain licenses and register with regulators. This ensures that they meet certain standards of security, compliance, and operational transparency, among others.

- As the global community welcomes the emergence of decentralised finance (DeFi), it is important to recognise the exciting opportunities it offers for financial inclusion and democratising access to financial services. However, it is equally important to proactively address the risks and challenges associated with this wave of transformation. To ensure the long-term success and sustainability of DeFi, ongoing research and development efforts should prioritise improving security measures. This

includes identifying and remediating smart contract vulnerabilities that can be exploited by malicious actors to compromise the integrity of the system. Robust risk management protocols should also be implemented to ward off potential liquidity issues and ensure the stability and resilience of DeFi platforms. By providing resources to these areas, the global community can foster a safe and trustworthy DeFi ecosystem. Collaboration between researchers, developers, and regulators is crucial to establishing best practices, sharing knowledge, and promoting the adoption of standardised security measures. This will not only protect the interests of users and investors but also contribute to the overall growth and maturation of decentralised finance, unlocking its full potential and driving financial inclusion worldwide.

- As a practical recommendation to the global community, it is imperative to recognise the significant momentum behind the exploration of central bank digital currencies (CBDCs). CBDCs hold enormous potential to improve financial stability, streamline transactions, and promote financial inclusion worldwide. To effectively navigate the complexities of CBDC implementation, collaborative efforts between central banks, policymakers, and technology experts must be prioritised. To ensure the interoperability of CBDC systems, global collaboration is essential. Central banks should work together to

establish common standards and protocols that enable seamless interaction and compatibility between different CBDC platforms. This will facilitate efficient and smooth cross-border transactions and promote international trade and economic integration. Considering privacy concerns are crucial when developing CBDCs, joint efforts should focus on implementing robust data protection frameworks that respect the rights of individuals while maintaining the necessary transparency and regulatory oversight. Technology experts should bring their expertise to develop privacy-enhancing solutions that strike the right balance between transaction transparency and data protection. In addition, policymakers must actively participate in the dialogue around CBDCs. Policies should be designed so that CBDCs are inclusive, accessible, and safe for all people, regardless of their socioeconomic background.

- It is crucial to recognise the enormous potential of integrating smart contracts and automation into financial processes. This integration can lead to significant efficiency gains and cost reductions. However, it is of utmost importance to approach this transition with careful consideration of the legal and regulatory framework to ensure the enforceability and accountability of smart contracts. To effectively leverage the benefits of smart contracts, governments and regulators should proactively

develop and update legal frameworks that address the unique challenges and opportunities of these automated agreements. This includes clarifying the legal status of smart contracts, establishing clear rules for their creation and implementation, and ensuring dispute resolution mechanisms. In addition, regulatory frameworks should focus on consumer protection and risk management. This includes implementing measures to protect against fraud, ensuring transparency and disclosure obligations, and establishing monitoring and accountability mechanisms for the use of smart contracts. The global community should prioritise the development of legal and regulatory frameworks to ensure the enforceability and accountability of smart contracts. In this way, the full potential of this technology will be realised.

- As financial systems increasingly rely on digital technologies, it is essential to prioritise robust cybersecurity measures, data protection regulations, and ethical considerations to protect user information and maintain trust in financial transactions. To ensure the integrity and security of financial systems, governments and regulators should establish and enforce strict cybersecurity standards. This includes implementing comprehensive frameworks that address potential vulnerabilities, promoting secure coding practices, and encouraging regular security audits and assessments. Data protection regulations should be

strengthened to give individuals greater control and transparency over their data. Governments should enact laws that establish clear guidelines for the collection, storage, and processing of financial data to ensure that individual privacy is respected and protected. Ethical considerations are also crucial in the digital age. Financial institutions and technology providers should adopt ethical frameworks that guide their practices in processing, using, and sharing data. This includes obtaining informed consent, implementing data minimisation and taking measures to prevent unauthorized access to or misuse of confidential financial information.

- The regulatory landscape is constantly changing, and governments must always strive to find a balance between promoting innovation and maintaining financial stability. To effectively address these difficulties, regulators, industry stakeholders, and academia must work closely together. To gain a comprehensive understanding of evolving technologies and their impact on the financial sector, regulators should actively engage with academic institutions and industry stakeholders. The creation of flexible regulatory frameworks that respond to changing market dynamics and technological breakthroughs can be supported through this collaboration. Together, economic actors, regulators, and scientists can identify threats and assess how innovations impact

financial stability. To gain a comprehensive understanding of new technologies and their implications for the financial sector, regulators should actively engage with industry players and academic institutions. This type of collaboration can provide valuable insights for creating flexible regulatory frameworks that can keep pace with changing market conditions and technological breakthroughs.

Way Forward for Nigeria

Nigeria is at a crucial juncture in embracing the digital revolution and harnessing the potential of cryptocurrency and blockchain technology for its financial system. Even if cryptocurrency does not displace the traditional financial system in the short term, it remains a complementary system and represents a major force to be reckoned with in the long term. To prepare for this digital revolution, the following are critical for Nigeria's future in this area:

- The Central Bank of Nigeria should actively engage with banks and other financial institutions to explore the potential for collaboration rather than imposing strict restrictions on cryptocurrencies. With this knowledge, regulatory frameworks can be developed that balance financial stability, consumer protection, and anti-money laundering measures, thereby promoting innovation and growth within the cryptocurrency ecosystem. While regulation is

undoubtedly important, it is also important to exercise caution and avoid hasty or excessive regulation that could inadvertently hinder the progress and potential benefits of cryptocurrencies. Early regulation should not serve to ignore the valuable aspects of cryptocurrencies along with their potential downsides. It is critical to find a balance between implementing the necessary regulations to ensure consumer protection and market stability while enabling innovation and growth in the cryptocurrency industry. Through a thoughtful and measured approach to regulation, Nigeria can reap the benefits of cryptocurrencies while mitigating the risks associated with them.

- It is a good and commendable step that the Securities and Exchange Commission (SEC) has published its new rules for the issuance, platform offering, and custody of digital assets. However, it is important to remember that in an evolving and rapidly changing sector such as cryptocurrencies, laws must be flexible and dynamic. For such laws to be improved and made more comprehensive, government agencies, regulators, and industry stakeholders must continue to collaborate and coordinate. Constant communication keeps regulations abreast of market and technical improvements, takes potential threats into account, and protects the interests of all stakeholders. The Nigerian government should continue working to

create comprehensive rules and regulations for cryptocurrencies. This includes clear tax laws, digital asset exchanges, and standards for digital asset providers. Creating a clear regulatory framework can protect customers, stop fraud, and address issues related to money laundering and illegal activities.

- To promote a culture of informed and responsible cryptocurrency use, it is essential to implement educational initiatives that meet the elevated level of cryptocurrency awareness in Nigeria. It is imperative to raise public awareness and comprehension of blockchain technology and cryptocurrencies, as well as its advantages, potential disadvantages, and ethical implications. This objective can be accomplished in a number of ways, including community education campaigns, industry events and seminars held at educational institutions, and the inclusion of blockchain and cryptocurrency subjects in school curricula to guarantee thorough comprehension. By encouraging individuals to gain knowledge about blockchain technology and understand the advantages and disadvantages of cryptocurrencies, they will be empowered to make informed decisions in this area. Given the pivotal role that universities play in fostering intellectual capital, it is important to continually refine the curriculum to reflect the dynamic nature of the cryptocurrency sector. The aim is to include relevant topics and practical training in

the courses so that finance lecturers can seamlessly integrate theory and practice while imparting knowledge to students. The National Universities Commission (NUC) and the Tertiary Education Trust Fund (TETFund) have a key role in promoting this development. By working with these regulators, universities can proactively adapt their educational offerings to the evolving cryptocurrency landscape. This includes equipping finance teachers with hands-on training on emerging topics in the field, enabling them to effectively deal with the intricacies of cryptocurrencies, and providing students with comprehensive and up-to-date insights. NUC and TETFund play a critical role in supporting universities in this endeavour, providing guidance and resources to improve the quality of cryptocurrency education. NUC can also introduce as part of the 70% Core Curriculum Minimum Academic Standard (CCMAS) a course on cryptocurrency and blockchain awareness at the general studies level considering the centrality of finance and the latter being all-comers' business.

- To ensure the well-being of those engaging in cryptocurrency transactions, the introduction of strong consumer protection laws is essential. These measures should include various components, including establishing dispute resolution procedures, implementing transparency requirements for cryptocurrency exchanges, and enforcing strict but

adaptable policies. Developing a comprehensive regulatory framework that guarantees fair procedures and protects customers' rights is crucial to instilling trust in the cryptocurrency ecosystem. To achieve this, it is crucial to implement strict Know Your Customer (KYC) and Anti-Money Laundering (AML) protocols. These protocols will help verify the identity of those involved in cryptocurrency transactions and prevent illegal activities such as money laundering. Additionally, improving cybersecurity measures is essential to protecting customers' sensitive data and mitigating the risk of cyber threats. Additionally, promoting ethical business practices among cryptocurrency companies is essential. This can be achieved through industry-wide initiatives and regulatory oversight that ensure companies maintain ethical standards in their operations and interactions with customers.

- To stay abreast of global best practices in cryptocurrency regulation, Nigeria should actively engage with foreign partners and regulatory organizations. Collaborating with nations dealing with similar issues can provide insightful information and promote the exchange of experiences and knowledge. This can help Nigeria align its regulatory strategy with global norms while considering its own social and economic environment.

- It would be beneficial for the Nigerian government to use cryptocurrencies to address financial inclusion issues. It is known that 60% of the Nigerian population remains unbanked. To provide easily accessible and affordable financial services to the unbanked and underbanked population, the government must consider forming alliances with fintech companies and blockchain-based platforms. This could include promoting the use of cryptocurrencies for international money transfers and making basic financial services more accessible using mobile solutions.
- It is important to improve monitoring and surveillance capabilities to detect and stop illegal cryptocurrency-related activities. Building collaboration between law enforcement agencies (such as the Economic and Financial Crimes Commission), regulators (CBN, SEC, and FIRS), and technology specialists (Fintech and startups) can facilitate the creation of efficient tools and systems to monitor cryptocurrency transactions. This makes it possible to detect suspicious activity early and take the right enforcement action.
- Encouraging innovation in the cryptocurrency market will help Nigeria's digital economy expand and thrive. Blockchain and cryptocurrency-related research projects, technology incubators, and startup ecosystems can all be funded by the government. This

will encourage investment and entrepreneurship and establish Nigeria as Africa's hub for cryptocurrency innovation.

Way Forward for UDUS

It is recommended that the university should:

- Given the growing importance of cryptocurrencies and blockchain technology in the financial sector, consider including courses or programmes on these subjects to provide students with opportunities to learn about these subjects, as well as equip them with valuable skills for future careers in finance and technology.
- Collaborate with industry leaders and establish strong relationships with companies in the cryptocurrency and blockchain sectors. This may involve participating in internships, collaborating on research projects, and hosting guest lectures by industry professionals. These partnerships will help students and faculty acquire valuable hands-on experience, industry knowledge, and potential job/investment prospects as UDUS moves in the direction of becoming entrepreneurship university.
- Organise workshops, seminars, and conferences focusing on cryptocurrencies, and blockchain. These events will bring experts, researchers, and practitioners together to share knowledge, exchange ideas, and explore current trends and advancements in the industry. Furthermore, these events will enhance

the university's standing as a hub for knowledge and creativity in the fields of finance and technology.

- Provide training programmes or short courses through the Centre for Open and Distance Education (CODE) targeted at professionals in the financial sector to enhance their skills or expand their understanding of cryptocurrency and blockchain. This could appeal to executives, bankers, financial analysts, and regulators. This way, the university can play a role in enhancing the expertise of the financial sector required in this modern era.
- Establish a specialised team or unit in the university's ICT Directorate that works on software development for the blockchain and cryptocurrency industries. Project managers, designers, and developers with experience should make up this team. Students should be encouraged through several IT-compete projects to key into these projects. The group should collaborate with stakeholders and companies to develop customized apps that adhere to strict specifications. This could entail creating applications for safe bitcoin transactions, utilising blockchain technology to manage supply chains, implementing smart contracts, or conducting data analysis for the financial sector.
- Encourage university staff to get involved in research and development projects focusing on cryptocurrency and blockchain technology. The university should

assist them in patenting creative software solutions or creating unique algorithms that can be sold or licensed for profit. If the university creates its own software or algorithms, it should consider options for licensing them to businesses in the industry. This may involve negotiating licensing deals that bring in continuous revenue for the university.

- Establish a program or facility dedicated to supporting cryptocurrency and blockchain startups, offering mentorship, financial backing, and resources to help them thrive. The university can also explore investment or revenue-sharing opportunities with successful ventures that emerge from the programme. It is important that such a facility keep itself abreast with the latest trends and advancements in the industry to discover new software development prospects and maintain a competitive edge.

7.0 FINAL WORDS

Blockchain technology and cryptocurrencies have the power to completely transform the financial sector in Nigeria and beyond if they are applied and developed responsibly. Indeed, the potential of this new digital currency and its underlying blockchain technology is widely acknowledged as disruptive and innovative, with its benefits outweighing its drawbacks. As this transformative wave persists, Nigeria should enthusiastically accept this disruptive and innovative

technologies and take the lead in modernising its financial sector through the implementation of cutting-edge digital technologies.

As for me, I have an insatiable desire to continue learning in this transformative area as we are living in a remarkable era of rapid change.

Thank you for joining us on this enlightening journey into the realm of cryptocurrency, blockchain, and the future of finance.

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