

Digital Currencies and National Development: Prospects and Challenges for Adoption

Johnson Femi Temitope* and Ojo Fidelis Folorunso

Computer Science Department, Federal University of Agriculture, Abeokuta, Ogun state, Nigeria

Email: femijohnson123@hotmail.com*

Abstract: Money serves as a medium for which goods and services are exchanged. Anything that can be generally accepted for settling of debts and used for performing financial transactions is being referred to as money in the olden days. Many countries in the world have a generally acceptable and commonly used currency among their citizenry. The 21st century application and usage of money has transcended the notion and belief of the existence of money in the form of regular bank notes and coins. Nowadays, digital currency, electronic money or electronic currency is being in use with quite an appreciable number of people inclining their insight towards its effective usage and more countries adopting it for financial transactions as against the conventional forms of money. This paper surveys a number of related literatures to give a clearer and broader explanation of the concept of digital currency, the various forms in which digital currency exists. A comparison of the degree of acceptability of different digital currencies was discussed with the mode of operation of digital currency. However, prospects and challenges for the adoption of digital currency as a tool for national development were also highlighted.

Keywords—Digital age, Mining, Cryptocurrency, Blockchain, Bitcoin, National development

1. INTRODUCTION

The term digital currency is a word directly linked to the digital age. It can be referred to as money (the medium of exchange for goods and services) in the digital age. Money is a unit of account, a means of payment and a store of value (David, 1969). Many things (such as cowries, Yap stones, gold coins, cigarettes in war times, etc.) have served as money in time past (Hicks, 1979). This present century is characterized with numerous forms of technological advancement which are evident on daily basis thus with a conclusion that we are living in a digital age.

The digital age signifies an era when social, economic and political activities are dependent on information and communication technologies. A period Gilpin (2014) referred as an information age. Digital technology has become prevalent and of common use throughout the world. It is therefore expected that the mode, means and method of performing transaction involving money needs be digitalized necessitating the adoption and usage of digital currency. Many authors have relayed their views on digital currency through different definitions. One of which include: Digital currency as a type of currency available in digital form in contrast to physical, such as banknotes and coins” (Wikipedia.org). It possesses similar properties as the physical currencies and creates room for an easier and instant transfer of ownership. Digital currencies do not have a physical equivalent in the real world. Nevertheless, the characteristics of traditional money are still evident on them.

Like physical money, they can be received, translated or exchanged for another currency. Payment for purchase of goods and services e.g. mobile communications, the Internet, bills in both online and offline stores can be made with digital currency (Moreau, 2018). They are not limited by boundaries – political or geographical as money is being sent and received by anyone at anywhere in the world through their electronic wallets (Milling, 2012).

Adinolfi (2017) explained that digital currencies can either be centralized or decentralized. If centralized, there exists a central point for the control of the money supplied or decentralized, such that money supplied come from numerous sources.

Any nation with the sole aim of developing both human and non- human resources must seek variety of ways and approaches to improve the economic and social status of its citizens. National development cannot be achieved without taking money (digital currency) that suits the digital age into consideration. At present, banks in Nigeria do not accept digital currencies neither do individuals earn interest on them as they are faced with challenges such as risk associated with individual identification, regulation and its acceptability among individuals.

2. LITERATURE REVIEW

2.1 Forms of Digital Currency.

The elimination of associated boundaries and intermediaries by the usage of digital currencies has made payments between payers and payees very simple, more transparent and also reduced related infrastructural cost as compared with the conventional method of payment. Thus promoting national development. Digital currencies exist in two major forms namely: Virtual currencies and Cryptocurrencies.

2.1.1 Virtual Currency

This is a form of digital currency with quite a number of definitions from various economic and financial bodies. First is the European Central Bank (ECB) definition of virtual currency as a “type of unregulated, digital money, which is issued and usually controlled by its developers, and used and accepted among the members of a specific virtual

community” (ECB, 2012). Another definition proposed by the European Banking Authority (EBA) further defines a virtual currency as a “digital representation of value that is neither issued by a central bank or public authority nor necessarily attached to a fiat (conventional) currency, but is accepted by natural or legal persons as a means of exchange and can be transferred, stored or traded electronically” (EBA, 2014). A major point for consideration on the use of virtual currency is trust. A certain percentage of trust level must be reached between the payer and payee to ensure smooth transactions between both parties.

Furthermore, the Financial Action Task Force (FATF) described virtual currency as a digital representation of value that can be digitally traded and functions as a medium of exchange, a unit of account or a store of value, but does not have legal tender status (i.e. when tendered to a creditor, is a valid and legal offer of payment) in any jurisdiction” (FATF, 2014). Other forms which virtual currencies may exist include credit card points, online gaming points, coupons, loyalty points etc. which can be traded for goods and services. For example, all JUMIA (an online shopping site) customers may have access to an online coupon code or points which afford them the privilege to purchase items. The coupon code will only be valid within the JUMIA store or site. It cannot be used in any other online or offline store such as Alibaba, Konga or ShopRite, therefore, it has no real world value.

2.1.2 Cryptocurrency

A cryptocurrency has no real world value. Ripple, litecoin, etherum, bitcoin, bitcoin cash are examples of cryptocurrency which are being transferred via peer-to-peer network over the internet (Halford, 2012). Cryptocurrencies security is enhanced by cryptography. A distributed ledger on a collection of networked computers known as Blockchain technology has a major role on these cryptocurrencies. Jake (2019) wrote in an online publication that the biggest allure of crypto currency is its organic nature since it isn't granted by an institution or central bank, it made it void of interference by any external body.

Bitcoin is by far the oldest and most common of the cryptocurrencies. Its rate of acceptability (compared with others) differs from one place to another. Companies and organizations like Microsoft, Ebay, Overstock.com, Expedia, Dish Network etc. are now accepting bitcoin and other cryptocurrencies as payment (Metz, 2013). The table below depicts a comparative list of fifteen most common cryptocurrencies.

S/n	Currency name	Founder	Programming language for Implementation	Release Year
1.	Bitcoin (BTC)	Satoshi Nakamoto	C++	2009
2.	Litecoin (LTC)	Charlie Lee	C++	2011
3.	Namecoin (NMC)	Vincent Durham	C++	2011
4.	Peercoin (PPC)	Sunny King	C++	2012
5.	Nxt (NXT)	BCNext (pseudonym)	Java	2013
6.	Ripple (XRP)	Chris Larsen & Jed McCaleb	C++	2013
7.	Dogecoin (DOGE)	Jackson Palmer & Billy Markus	C++	2013
8.	Gridcoin (GRC)	Robert Ford	C++	2013
9.	MazaCoin (MZC)	BTC Oyate	C++	2014
10.	Neo	Da Hongfei & Erik Zhang	C#	2014
11.	Stellar	Jed McCaleb	C++	2014
12.	Tether (USDT)	Jan Ludovicus	C++	2015
13.	Ethereum (ETH)	Vitalik Buterin	C++, Go ^[58]	2015
14.	Zcash (ZEC)	Zooko Wilcox	C++	2016
15.	EOS.IO (EOS)	Dan Larimer	WebAssembly, Rust, C, C++	2017

Table 1. Common examples of cryptocurrencies.

Source:

https://en.wikipedia.org/wiki/List_of_cryptocurrencies

2.2 Bitcoin: The Most Common Digital Currency

Bitcoin from history has been traced to an unknown person or group of people with the name Satoshi Nakamoto (S., L.2015). Patron (2014) claimed that a blockchain database which serves as an electronic ledger was

implemented by them. In the process, they were the first to solve the problem of double-spending in digital currency using a peer-to-peer network (Wikipedia.org). Kelion (2013) described bitcoin as a new financial system, designed by the people, for the people and theoretically everyone has equal power. People control their own money and the rules of the bitcoin system are enforced on everyone by each other through mutual distrust. Unlike government currencies, there is no central bank backing bitcoin and anyone with a computer or an Application-Specific Integrated Circuit (ASIC), which is a dedicated machine specifically created for the purpose, can create a bitcoin by a process called mining.

E-wallets serve as reservoirs for mined bitcoins. Bitcoin price was also determined by the amount the buyer is willing to pay. If no one uses bitcoin it would have no value. Due to its high volatility, it has made and lost fortunes to many people (Kelion, 2013). On 3rd January 2009, Nakamoto mined the first block of the bitcoin network chain known as the genesis block (Wallace, 2011). Embedded in the block was the text: "The Times 03/Jan/2009 Chancellor on brink of second bailout for banks" (Davis, 2011). Pagliery (2014) gave the interpretation of the text as a comment regarding the instability caused by fractional-reserve banking AND both a timestamp. Cypherpunk Hal Finney being the first person to receive a bitcoin transaction downloaded the bitcoin software on its release date and received ten bitcoins from Nakamoto (Popper, 2014). Similarly, two Papa John's pizzas were purchased by Laszlo Hanyecz (a programmer) for 10,000 bitcoin. This was recorded as the first commercial transaction performed with bitcoin (Kharpal, 2018).

Robot (2016) acclaimed that about one million bitcoins had been mined by Nakamoto before he handed over the network to Gavin Andresen. Andresen who later headed the Bitcoin Developers Foundation decentralized its control which paves way for the mining of more bitcoins and other cryptocurrencies (Odell, 2015).

2.2.1 Digital Currency Modus Operandi – The Bitcoin

The operation of a cryptocurrency is based on a peer-to-peer network unlike a conventional payment system there exist a profit making company in the middle, which controls transactions, coordinate the network to ensure its security and reliability. A set of rules known as the Bitcoin Protocol governs the bitcoin system. When an individual - A wants to pay a certain amount of bitcoins to another individual-B, payment instruction is placed in the system, along with other payment instructions. A group of people known as miners validate payments and record them in a newly created block by solving a computationally demanding mathematical problem that is created and specified by the Bitcoin Protocol

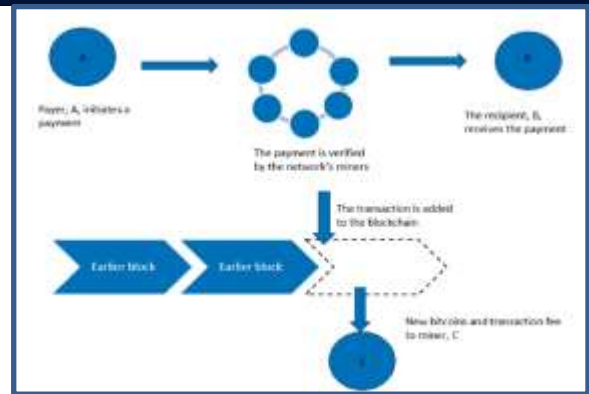


Fig1. Overview of a bitcoin structure Source: Söderberg (2018).

The cryptographic algorithm i.e. a Secure Hash Algorithm (SHA) which is 256 bits (SHA- 256) guarantees the security of the cryptocurrencies as opposed to that provided by government in conventional money. Since there is no financial institution or government interference on the network (block chain), the exchange rate of bitcoin varies invariably with other conventional currencies of the world. Research has shown evidently that bitcoin has been less than a dollar in 2011 to more than \$1,200 in 2015 and presently about \$4000.

In addition, miners who compete and to solve the problem are rewarded with the ability to add a block to the Bitcoin global transaction register and get a certain number of bitcoins as reward. However, because of the computing task involved, groups of people join a mining pool of thousands of users each contributing their computing power to solving this problem and being rewarded with a share of the profits from the solving of the problem (Reinhart et al., 2015). Bitcoin was originally thought to be the "people's currency" in the digital age and that computing power would be decentralized such that everyone would have an equal chance of solving the bitcoin problem called a hash function. Hash functions are solved more efficiently by dedicated equipment built specifically for this purpose. Rather for an average computer user trying to mine bitcoin with his/her own PC, it has now become the realm of people or groups of people investing hundreds of thousands of dollars into dedicated machinery which only has one function and that is to solve the hash function (Lee, 2013).

Furthermore, since Bitcoin is open source anyone can get the source code, make minor modifications and then create a similar network to Bitcoin thereby creating their own currency. Chayka (2013) "A major alternative to Bitcoin is called Litecoin, (sometimes called the silver to Bitcoin gold)". Litecoin uses an algorithm called Script that was supposedly more difficult to automate. However, after considering the amount of money that could be made, it was inevitable that dedicated machinery would be produced for the Script algorithm and since 2014 there are numerous Script ASIC devices available in the market.

2.3 Major Technological features of Cryptocurrencies

As at this present age, there exists over a thousand digital currencies and the number is rapidly growing. While most (including the most popular—bitcoin) use Blockchain technology the particular features of some digital currencies may differ significantly (Hobson 2013). Moreover, it is impossible to predict the future technological innovations that may be used by the creators of new digital currencies (cryptocurrencies). However, some key features of today's cryptocurrencies include the following:

2.3.1 Electronic Verification of Transaction

Transactions performed using cryptocurrency are void of central bank or any institutional verification. Since bitcoins are created in a decentralized manner by the community of miners. Each Bitcoin transaction process uses cryptography to verify transactions, process payments, and control the supply of bitcoins (Badev and Chen, 2014).

Cryptography has been used since antiquity to secure information. Similar to it is a bitcoin transaction with an encrypted message that facilitates transfer of bitcoins from the sender's electronic address to the recipient's electronic address. Bitcoin employs two cryptographic schemes namely: Digital signatures and Cryptographic hash functions. Digital signatures help to ensure the following:

- i. that the recipient can verify that the message came from a particular sender
- ii. the sender cannot deny sending a message
- iii. the message has not been tampered with while the Cryptographic hash functions enforce discipline in writing transaction records in the public ledger.

Both of these schemes existed before the creation of Bitcoin and were widely used to secure commercial and government communications (Badev and Chen, 2014).

2.3.2 The Bitcoin Underlying Protocol

Bitcoin technology allows users to send and receive individual bitcoins without the need for a trusted central counter party because it provides a solution to the double spending problem (fraudulently spending money twice without others noticing). Beyond, that the bitcoin protocol creates a complex system of economic incentives that govern its inner workings (Mcenna, 2017). The key to Bitcoin's security is its resilience to manipulations by attackers who may choose to join the system under multiple false identities (Vigna, 2016). After all, anyone can download the open-source code for a Bitcoin node and add as many computers to this network as they like, without having to identify themselves to others. To counter this, the protocol requires nodes that participate in the system to show proof that they exerted computational effort to solve hard cryptographic puzzles (proof-of-work) in order to participate actively in the protocol.

In addition, every participant has his own secret private key to access his own funds and authorize transactions. If

one loses his private key, all associated bitcoins can no longer be accessed, since there is no central party that could intervene (Greenspan, 2016). Via a one-way derivation a public key is generated from the private key. The public key provides the address if others want to send bitcoins to this participant. Halford (2016), "According to the technological protocol, there will be a maximum of approximately 21 million bitcoins; once this number is reached, no further bitcoins will come into circulation".

2.3.3 Storage of Currency in E-Wallets.

Units of digital currencies are stored in electronic wallets with electronic addresses that possess unique public IDs. An E-wallet function like a bank account where we can store the transactions made. It can also be used to send and receive digital currency. Multiple addresses can be combined into an e-wallet. Transactions are recorded in a public decentralized ledger, often referred to as "Blockchain". Common examples of e-wallets providers for digital currencies are Blockchain, Luno, Ngxchanger, Btc.com, Coinbase etc.



Fig. 2. Common examples of digital currency e-wallets

2.3.4 Higher Speed of Transactions.

Digital currencies offer a higher speed of transactions as opposed to traditional banking transactions in sovereign currencies. For example, Bitcoin is referred to as a near-instantaneous payment system, as it takes on average 10 minutes to process one transaction (Badev and Chen, 2014). Another advantage is the fact that payments are validated on 24/7 basis, whereas traditional payment systems usually have no more than several clearing sessions per day and do not function during holidays and weekends. Badev and Chen (2014) argue that the digital currencies transaction process is fairly complex, and some computer scientists have questioned its suitability for fast payments.

2.3.5 Increased Anonymity and Security of Personal Data

An advantage of digital currency is that payments do not require the provision of sensitive data such as name, address, credit card number, or phone number, which are often necessary to authorize payments in conventional payment systems. This feature of digital currency excludes the possibility of potential identity theft (EBA, 2014). Although,

perfect anonymity would be very hard or even impossible to achieve (Goldfeder et al., 2017)

3.0 CHALLENGES OF DIGITAL CURRENCY ADOPTION.

The visible illustrations and spread of technological advancements has brought great improvement in the ways people transact businesses and keep money. Despite the outburst of new innovations such as the digital currency, many are still yet not convinced of the adoption of the digital currency as a medium of exchange in this digital age. Some of the challenges limiting the adoption of the digital currency include the following.

3.1 Value and Acceptability.

Digital currency was not of interest to the general public, since mainly cryptographers, hackers, computer scientists and mathematicians understood its purpose and use. Considering the fact that it operates on a peer-to-peer network, there are no additional fees gained by middlemen such as banks and other financial institutions on its usage and as a result, they (banks and institutions) may not encourage its adoption thus, hindering digital currency from achieving its real purpose as an innovative new form of currency in the digital age for national development.

3.2 Lack of Digital and Financial Literacy

If the level of economic and financial literacy among the public is low one would possibly expect that this could potentially limit individuals and communities from being able to make the most of the new opportunities presented by digital platforms. The key task in this regard is the inclusion of digital and financial literacy as part of formal schooling to aid national development.

3.3 High Volatility and Unexpected Exchange Rate of Fluctuations

Digital currencies like bitcoin are subject to high volatility and unexpected exchange rate fluctuations (Wallace, 2011). "Its high volatility, a result of speculative activities, is hindering its general acceptance as a means of payments for online commerce" (Popper, 2014). Exchange rate fluctuations could (but do not have to) be the result of involvement in a Ponzi scheme or the build-up of a price bubble. An excellent example is the behaviour of the bitcoin exchange rate to the US dollar, which fell from US\$ 19,435 on 17 December 2017 to US\$ 6,858 on 5 February, 2018.

3.4 GOVERNMENT INVOLVEMENT, POLICIES and REGULATIONS.

The non-involvement of government in digital currency has also posed a challenge in its adoption .It was suggested that

if governments may increasingly choose to engage with cryptocurrencies as a valuable commodity and exert influence where possible then its adoption will be geared toward national development.

Countries like Japan and Russia have recently taken steps to legitimize the use of cryptocurrencies. It was felt that policymakers face a challenge in terms of deciding when it is appropriate to regulate or not regulate new forms of currency – and for regulators to understand the new forms of currency or transaction methods sit within or outside of the existing regulatory sphere.

4.0 CONCLUSION.

Digital currencies were largely absent in the economic scene during the 20th century. They are a relatively new invention and have remained with us for a while. The acceptability and usage of digital currencies is hinged on individuals and countries perspective. For example, China explicitly or implicitly bans them while others, like Switzerland, are trying to attract digital currency investors and operators. Conventional money is also being substituted with digital currencies as observed recently in Venezuela. Venezuela plans to issue her own national digital currencies (The Economist, 2018). In most countries, especially in major jurisdictions, authorities have adopted the "wait and see" attitude, while closely monitoring developments in digital currencies. Several financial authorities issued informal warnings to the general public, advising of the dangers of involvement in digital currencies

However, digital currencies (especially cryptocurrencies) are thriving since the number of businesses and people who accept them as payment are increasing (Nelson, 2018). A significant number of people are now fully convinced that the digital currency-Bitcoin is legitimate, safe and has value. "Bitcoin is going to be transformative" (Leinwand, 2013) but unfortunately, since it is virtually untraceable it has been used for a host of nefarious purposes. Although, digital currencies may appeal to criminals and present a host of new challenges to law enforcement," (Ribeiro, 2013), its adoption as a tool for national development in the digital age should not be discouraged.

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