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Theoretically Assessing Blockchain Solutions for Zimbabwean Citizens

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Abstract

The founding of Bitcoin (BTC) in 2009, led to the development and establishment of more crypto assets and blockchains. At the time of writing this working paper, the conservative market capitalization of the crypto asset industry stood at US\$2.5 tn; consisting of approximately 12,900 officially registered crypto assets listed on more than 400 officially registered exchanges. It is thus ostensible that individuals who are interested to invest in crypto assets may be overwhelmed with options available to them—stemming from a lack of crypto education. In the same vein, Zimbabwean citizens are advocating for the adoption of Blockchain Technology (BT), yet most of them do not fully understand how this same technology will benefit them. Thus, the primary objectives of this study were to (1) educate the Zimbabwean citizens on the main aspects of BT; and (2) to explore the different ways they can benefit from the adoption of BT in Zimbabwe. To achieve the latter, non-empirical, exploratory research was conducted in the form of an online desktop review. From the research conducted, the main components in BT are (1) the blockchain; (2) crypto assets; (3) crypto exchanges; and (4) crypto wallets. In terms of benefits, Zimbabwean citizens can benefit through (1) increased investment opportunities; (2) convenient, cheap, and fast remittances; (3) business funding opportunities; (4) protection from weakening currency; (5) buying electricity from prosumers; (6) using art to earn income; (7) increased borrowing and lending opportunities; (8) price stability; (9) increased international trade opportunities; (10) improved governance; (11) improved medical services; and (12) improved food services.

Keywords: Zimbabwe, Crypto asset, Crypto investment, Cryptocurrency, Crypto exchanges, Bitcoin, BTC

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1. Introduction

Looking at the current crypto news in Zimbabwe, there seem to be light at the end of the tunnel (Masama and Bruwer, 2021, p. 10). The question is “Do you know where to start when Blockchain Technology (BT)¹ is finally adopted?” To navigate successfully through the terrains of this disruptive BT requires knowledge and skills to use the key components (Shaik, 2018). To begin with, many people think that Bitcoin (BTC) is the only crypto asset out there (Wheatley et al., 2021; and Levine, 2021). However, this is not surprising since BTC is regarded as the “grandfather” of crypto assets (Tan, 2020). Some do not know the difference between a Centralized Exchange (CEX) and a Decentralized Exchange (DEX). When it comes to crypto wallets, many do not know the difference between a cold wallet and a hot wallet.

Having a basic understanding of the components that we use often, leads to informed decision making suitable for individual needs (Giovetti and McConville, 2020; and Miracle Consultants, 2021). In essence, understanding these

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¹ All new terms will be defined and/or explained in the literature review.

components will enable individuals to blend BT with their innovative ideas, thereby significantly improving their lives. Additionally, the more empowered individuals get, societies eventually become economically active; thereby alleviating poverty and inequality (Giovetti and McConville, 2020). But, without a clear understanding of these concepts, people risk: (1) being scammed; (2) paying unnecessary high fees; (3) getting frustrated; (4) missing out on opportunities; and/or (5) losing access to your fortune forever (Reserve Bank of Zimbabwe (RBZ), 2017; Jackson, 2021; and Popper, 2021).

Using the above as a basis, the primary objectives of this study were to: (1) educate the Zimbabwean citizens on the main aspects of BT; and (2) to explore the different ways citizens can benefit from the adoption of BT in Zimbabwe, in a theoretical sense. For the remainder of this study, discussion takes place under the following headings: (1) research design, methodology and methods; (2) literature view; and (3) conclusion.

2. Research Design, Methodology and Methods

This non-empirical study was exploratory in nature since research in this field is still gaining momentum. Thus, the main focus of this research was the discovery of theoretical ideas and/or theoretical insights (Churchill, 1995). To achieve the main objectives of this study, a qualitative research methodology was decided on. With qualitative research, secondary data is analyzed in order to achieve the set primary objectives (Heaton, 2003). To shed light on the phenomenon under study, online desktop research was used since this study allows the review of secondary data, from pre-existing sources (e.g., websites, journals, and research reports) (Bruwer *et al.*, 2021). Acknowledging the limitations of online desktop research, the author took reasonable steps to minimize author subjectivity through searching for secondary data by using various keywords such as “crypto”, “crypto investment”, “cryptocurrency”, “blockchain”, “crypto assets”, “crypto borrowing”, “crypto lending”, “blockchain benefits”, “developing countries”, “blockchain technology”, and “Zimbabwe”.

3. Literature Review

3.1. The Concept of Blockchain

A person with a pseudonym “Satoshi Nakamoto” developed the first blockchain with an attempt to avoid double spending (Nakamoto, 2008, p. 1). Thus, a blockchain is a digital record of transactions (ledger) that is distributed (decentralized) to many participants (nodes²) (Zeng *et al.*, 2021, p. 4). In this record keeping process, digital data about transactions is added to connected blocks thereby forming a chain. Simply put, a chain of data blocks results in a blockchain. Participants on a blockchain have to agree on the transactions being added to the blocks (Zeng *et al.*, 2021, p. 4). Currently, there are three common ways to reach agreement, and these are Proof Of Work (POW)³, Proof Of Stake (POS)⁴ and Proof Of Authority (POA).⁵ These consensus algorithms will be discussed in detail in the next working paper. According to Panetta (2019) a blockchain is complete if it possesses five characteristics shown in Figure 1.

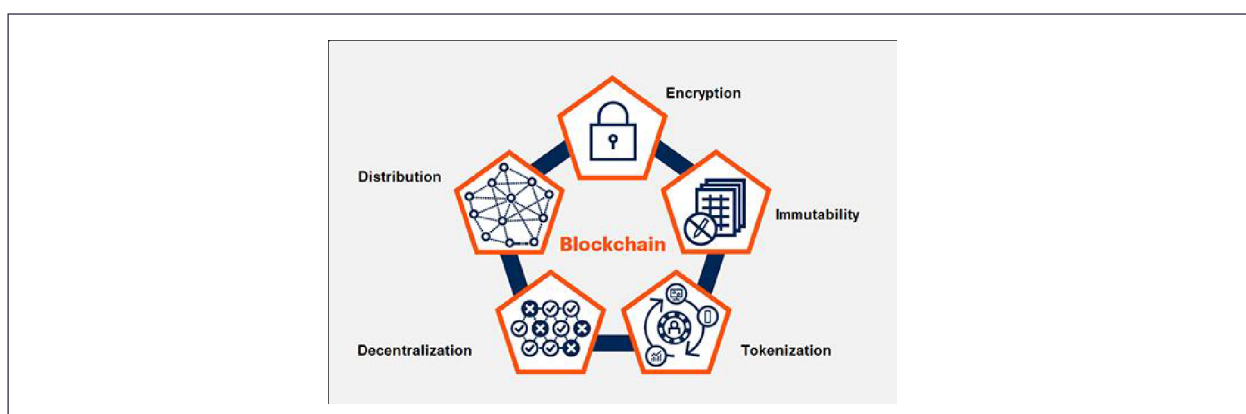


Figure 1: Five Key Characteristics of a Blockchain

Source: Panetta (2019)

² A node is a device in a network that has an ability to send and receive information within that network (Fisher, 2021).

³ POW is where participants in a blockchain network are required to solve a complex mathematical equation by guessing, the one who gets the answer first is given the right to validate a transaction thereby adding it to the block (BitDegree, 2021).

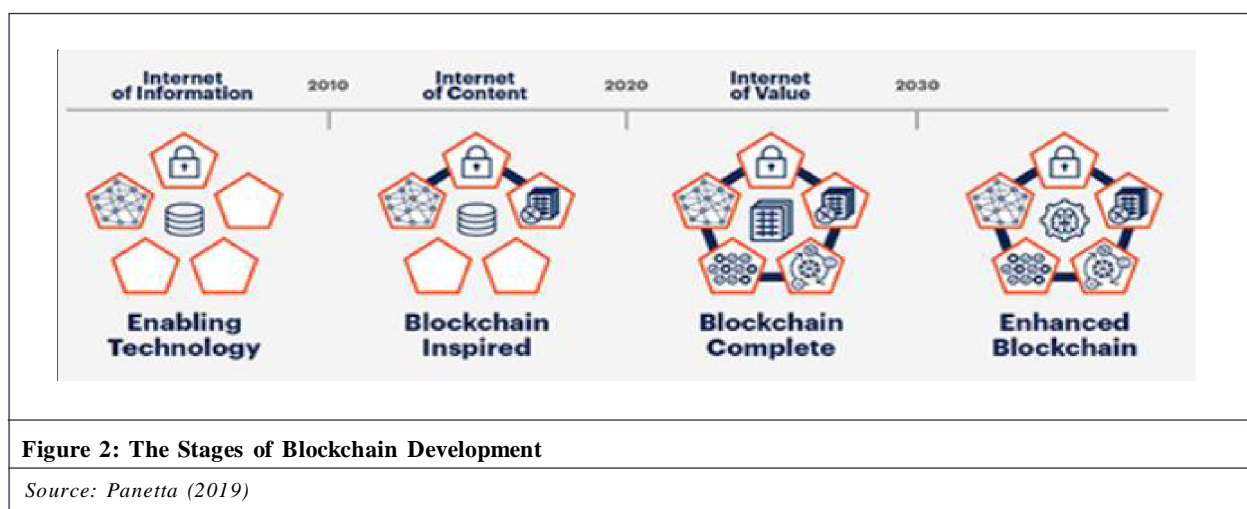
⁴ With POS, participants should stack a significant number of coins in order to stand a chance of being selected to validate the next transaction (BitDegree, 2021).

⁵ Under POA, validating participants are selected through a rigorous selection process (Bogdanov, 2021).

The five components shown above are briefly explained below (Panetta, 2019; Iredale, 2020; and Loshin and Cobb, 2021).

- **Encryption:** Method that uses complex mathematical calculations to convert information into a secret code, thereby hiding the true meaning of the original message.
- **Distribution:** Using more than one device in the operations of a network.
- **Immutability:** Having the characteristics of not being able to be changed.
- **Tokenization:** The representation of other objects (physical or virtual).
- **Decentralization:** The absence of a central controlling authority.

Considering that the BTC blockchain can not support other applications, while the Ethereum blockchain can support other applications points to the fact that a blockchain evolves through many stages (Panetta, 2019; and Coding Bootcamps, 2021) shown in Figure 2.



The four stages displayed above are briefly explained below (Panetta, 2019; and Coding Bootcamps, 2021).

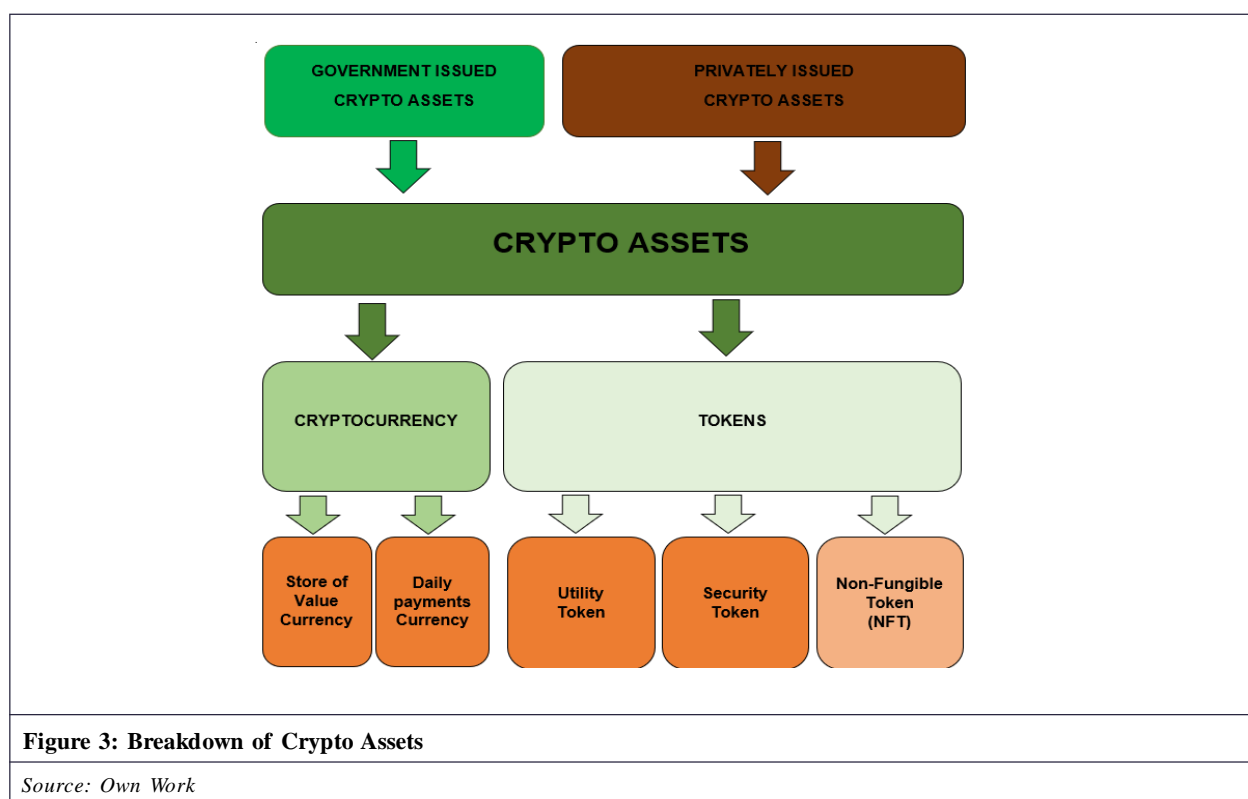
- **Enabling Technology:** At this stage, a blockchain will be performing basic function that it was initially designed for.
- **Blockchain Inspired:** Stage two entails the ability of a blockchain to handle smart contracts – self executing contracts once certain conditions are met.
- **Blockchain Complete:** This is a stage where a blockchain will be completely decentralized and being used for issuance of tokens.
- **Enhanced Blockchain:** Although the components are the same with the previous version, an enhanced blockchain will have the autonomous⁶ feature.

Now that we have looked at what a blockchain is, it is time to dive into that which the first blockchain was meant to facilitate – crypto assets.

3.2. Crypto Assets

Basically, an asset is a resource that you are going to use or sell, thereby extracting value (Corporate Finance Institute (CFI), 2021). According to South African Revenue Service (SARS, 2021), a crypto asset is a virtual representation of value. Historically, crypto assets have been issued by private entities, not central authorities (SARS, 2021). In recent times, central banks around the world are contemplating issuing their own crypto assets, in form of Central Bank Digital Currencies (CBDCs) Bank for International Settlements (BIS, 2018, p. 4), formerly called Central Bank Cryptocurrencies (CBCCs) (Bech and Garratt, 2017, p. 55). From the above-mentioned, it is evident that the only thing differentiating BTC and a CBDC is the issuer. In essence, crypto assets are either issued by private entities or central authorities (BIS, 2018, p. 5). According to Kraken (2021), crypto assets are split into five categories namely: (1) payment currency; (2) store of value currency; (3) utility/infrastructure token; (4) security tokens; and (5) media and entertainment/non-fungible tokens. Stemming from the above information, the following depiction of crypto assets is developed.

⁶ Autonomous means being able to make own decisions – being independent (Search Security, 2021). This is clearly illustrated in the case of Sophia, a robot with a citizenship (Hanson Robotics, 2021).



The above five crypto assets classifications are discussed below (Hodlbot, 2019; Deloitte, 2020; Kraken, 2021; Quantifi, 2021; Exodus, 2021; Yori, 2021; Clark, 2021; and Universal Money Instrument (UMI), 2021, p. 59).

- **Payment Currency:** This type of crypto asset compete with established fiat money. It can be used in day-to-day transactions (e.g., USDC and USDT). In essence, all stable coins⁷ and CBDCs are payment currencies.
- **Store of Value Currency:** Because of inflation, it is not wise to keep fiat currency. This crypto asset does protect from inflation (e.g., BTC).
- **Utility Token:** This is a crypto asset that will be used to facilitate all transactions in a blockchain. In other cases, the tokens are used to access a future service (e.g., UMI and Ethereum (ETH)).
- **Security Token:** This token represents rights to a physical asset (e.g., SolarStake (SLRS)).
- **Non-fungible Tokens:** Non-fungible means things that are unique and cannot be replaced with something else. These tokens are created from ART, music clips, sports, etc. It is important to note that NFTs have their own marketplace different from other crypto assets.

Practically, it is possible for a crypto asset to fulfil two or more roles.

The decision on which coin to buy depends on a number of factors including your objective for getting involved in crypto. In essence there are three main reasons why people buy crypto, and these are to: (1) HODL⁸ (holding on to the coins for a long time); (2) trade (buying at lower prices and selling at high prices); and (3) combination of both. After deciding on the crypto asset to buy, and the reasons, the next thing is to look for a marketplace for crypto assets, that supports the chosen crypto asset – crypto exchange.

3.3. Crypto Exchanges

3.3.1. Crypto only Exchange vs. Fiat Support Exchange

In most cases, new crypto investors need to use cash in their bank accounts or a credit card to buy crypto assets (Voigt, 2021). Unless if there a person willing to sell their crypto assets (Peer to Peer (P2P) trading), one should register with an exchange that support fiat currency used in the country of residence. In a South African dispensation, Sigen Pro is a crypto only exchange, whereas AltCoinTrader is a Fiat support exchange (Crypto Wissner, 2021). Currently, Zimbabwe

⁷ A stable coin is a crypto asset that is backed by fiat currency. Most stable coins are currently backed by the US\$ (Adrian, 2019).

⁸ HODL is a crypto acronym for Hold On for Dear Life, which simply means holding coins for a long time (Thomas, 2021).

does not have a crypto exchange that support Zimbabwean fiat currency because of the 2018 bank ban (RBZ, 2018). However, considering the current positive crypto views from Zimbabwean government, that is expected to change for the better (Masama and Bruwer, 2021, p. 10).

3.3.2. CEX vs. DEX

Generally, a CEX has a central authority, whereas there is no central authority in a DEX (Victor, 2021). A DEX only deals in crypto assets and does not support fiat currency. However, with the emergence of stable coins and CBDCs, fiat currency can be represented on a DEX (Lee and Teo, 2020, p. 31). Below is Table 1 with advantages and disadvantages of both CEX and DEX.

First time users are encouraged to use CEXs until they gain experience to use DEXs (Victor, 2021). The last aspect to be addressed pertains to the storage of your coins – crypto wallets.

Table 1: Advantages and Disadvantages of CEXs and DEXs	
Advantages	
CEXs	DEXs
<ul style="list-style-type: none"> • These have high trading volumes, leading to high liquidity levels. • It is possible to convert from fiat to crypto assets and vice versa. • More features are available (e.g. margin trading, exchange stacking and limit order trading). • Easy for users to use these platform. 	<ul style="list-style-type: none"> • Privacy and anonymity is guaranteed as no identity verification is required. • DEXs are more secure because they do not keep users’ private keys and do not require identity checks. • There is an integration between DeFi and NFT.
Disadvantages	
<ul style="list-style-type: none"> • They use strict Know-Your-Customers (KYC) policies. • Users do not have access to their private keys. • These exchanges are susceptible to hacks. 	<ul style="list-style-type: none"> • Liquidity is low due to low trading volumes in most DEXs. • These DEXs are not as fast and efficient because of scalability problems. • Some DEXs are not easy to use, especially for first time users.
Source: Victor (2021)	

3.4. Types of Crypto Wallets

Basically crypto wallets are split into two broad categories, namely: hot wallets and cold wallets (Exodus, 2021; and Cryptopedia, 2021). Hot wallets requires internet connection to function, whereas cold wallets do not need internet connection (Rodriguez, 2021; and Sharma, 2021). Figure 4 below shows the subcategories under each group.

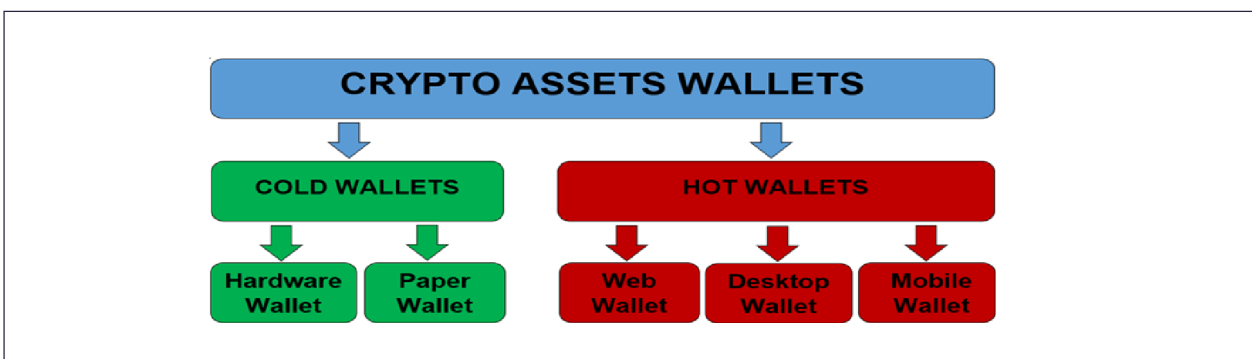


Figure 4: Classification of Crypto Assets Wallets
 Source: Own Work

The five wallets depicted above are described below (Rodriguez, 2021; Sharma, 2021; Exodus, 2021; and Cryptopedia, 2021).

- **Hardware Wallet:** This is the safest wallet as it does not require internet to function. It consists of a specialized hardware device, that is used to store your crypto assets, and it is most suitable for long for long term use. Unfortunately, it is expensive for an average person to purchase.
- **Paper Wallet:** With a paper wallet, your private keys will be stored on a piece of paper, and they are scanned to move the stored crypto assets to another wallet. This wallet is also ideal for long-term holding of crypto assets. Although it is safe because it is not connected to the internet, one can easily lose the paper thereby losing access to the crypto assets stored on that paper. Furthermore, a paper wallet is not readily accessible.
- **Desktop Wallet:** This is a wallet that is installed and used on desktops and laptops. Most of the desktop wallets have built-in exchanges, making it easy to do transactions on a crypto exchange. Unfortunately, they are susceptible to internet dangers.
- **Mobile Wallet:** This is similar to a desktop wallet but operate on mobile applications. With a mobile wallet, you can make payments anytime, anywhere. Most mobile wallets give the user full control, by providing them with private keys. Just like the desktop wallet, a mobile wallet is also susceptible to internet risks.
- **Web Wallet:** This is an online wallet, which in most cases requires users to login. Most wallets offered by exchanges are web wallets, and can be accessed using desktop, laptop, or mobile device. This wallet is easy to use, and gives users access to some important features only available on centralized exchanges. Unfortunately, users do not have full control of their crypto assets as they do not get private keys. Furthermore, web wallets are vulnerable to hacking.

Having covered the most important basic aspects in the BT ecosystem, it is time to focus on the solutions that can be afforded to Zimbabwean citizens by BT.

3.5. Blockchain Technology Solutions to Zimbabwean Citizens

Whether you are in Zimbabwe or outside, everyone stands to benefit a great deal from the adoption of BT by the Zimbabwean government. In broad terms, the financially excluded Zimbabwean residents will benefit from BT through increased access to financial services. Furthermore, the actual benefits of BT in a society are too many, but, for this study, only the common ones are discussed. Below is a discussion of the specific ways that this disruptive technology will benefit all Zimbabwean citizens (PricewaterhouseCoopers (PWC), 2015, p. 24; Engadget, 2016; Biti and Moss, 2016; Miller, 2017; Holtmeier and Sandner, 2019, p. 15; Leonardo Energy, 2019; Infinite Energy, 2020; Shumba, 2021; Skrill, 2021; New Delhi Television Ltd (NDTV), 2021; The Borgen Project, 2021; World Bank, 2021; BitcoinKE, 2021; Newsday, 2021; Chasi *et al.*, 2021; Soto *et al.*, 2021; and Deutsche Welle (DW), 2021).

- **Increased Investment Purposes:** This is probably the obvious reason why many are attracted to crypto assets. Looking at BTC, the most popular crypto asset, it has increased by approximately 82,544,834% since, May 10, 2009 (1 BTC = \$0.0007639) until the time writing, October 21, 2021 (\$63 056). This unfathomable increase simply shows the capability of BTC as a long-term investment. Even in the short term, BTC has showed the abilities to reward the holders with significant returns. However, it is not only BTC that is proving to be a good investment opportunity. In general, all crypto assets, except stable coins and CBDCs are expected to increase in value, though some fail even before seeing daylight.
- **Convenient, Cheap, and Fast Remittance:** Whether one is sending money to or from Zimbabwe, the remittances are currently high, considering what they can be if BT is used to facilitate these remittances. In 2020, the average cost of sending money to Zimbabwe was 9.97% of the funds being remitted. Currently, there are new coins that are working on free transfers, and this will have a big positive effect on remittance costs. In his recent visit to Dubai, the Zimbabwean Finance Minister came to appreciate the role BT can play in reducing remittance costs.

Another challenge with some of the current remittance methods is that of time it takes for recipients to receive the money in their hands. In many cases, the recipient will have to wait in a long que to collect the money. Some use bus drivers to send money back home, and it takes 1.5 days to 2 days to get to the recipient. With the use of BT, all these challenges will be resolved.

Lastly, the issue of convenience is significantly improved by using BT. In essence, with BT one can send money anytime, any day, and from anywhere.

- **Protection from Weakening Currency:** Since 2009, Zimbabwe has struggled to maintain a stable currency that is recognized by the international community. This has resulted in the country using the Rand and US\$ at some point. Thanks to BT, Zimbabwe can now have a digital currency that is internationally recognized. Using digital money is now second nature to Zimbabweans, who at some point, were relying on Ecocash (mobile money) to transact.

In the event that Zimbabwe does not issue its own CBDC, residents will have an option to keep their funds in crypto assets wallets, thereby protecting their buying power. This is now achievable, thanks to stable coins.

- **Price Stability:** It is expected that issuing a Zimbabwean CBDC according to widely accepted standards will give the nation a stable currency. Furthermore, the programmable nature of CBDCs have additional benefits to the country. In essence, the high inflation rate in Zimbabwe will most likely be curbed.
- **Business Funding Opportunities:** People with innovative ideas will be able to raise the required capital through the issue of tokens. For example, a farmer can issue tokens that will be used at a later stage to purchase farm products in the future. Furthermore, BT allows to pull funds by contributing smaller amounts (e.g. \$1) per person, and people will be able to contribute from all over the world.
- **Lending and Borrowing Opportunities:** The rise of DeFi, powered by smart contracts, means crypto assets holders are now able to lend and borrow crypto assets. You will need to have collateral in form of a different crypto asset than the one you want to borrow. For example, you might be having 1 BTC in your wallet but you need USDT. If you do not want to sell your BTC, you can use it as collateral to get the USDT that you want. Upon the repayment of the loan, you will automatically receive your collateral back. In addition users are able to lend their crypto assets so that they can earn interest.
- **Using Art to Earn Income:** Zimbabwean artists do not earn much compared to their counterparts in other countries. Most of them do not have the platform to present their gifts on the international stage, fortunately, NFTs are bridging that gap. Recently, there is a Zimbabwean artist who sold a drawing for over \$8 000, and surely more will follow this route.
- **Increased International Trade Opportunities:** With the use of BT, it will be easy to use CBDCs to purchase other crypto assets to be used in international trade payments. Hence, those Zimbabweans engaged in cross border trade will find BT very helpful.
- **Buying Electricity from Prosumers:** A prosumer is someone who produces and consumes something at the same time. For example, a person who uses solar energy to generate household energy. In essence, those with excess energy will be able to sell to their neighbors without involving the middlemen, in this case the Zimbabwe Electricity Transmission & Distribution Company (ZETDC). This means electricity will be cheaper within a community. This solution of P2P energy trading might seem farfetched; however, it has already been tested in other countries, and it will surely come to Africa, specifically Zimbabwe, soon.
- **Improved Governance:** In Africa, corruption is an everyday topic, and has become the new normal. With the usage of BT, the usage of public funds can be verified by anyone interested to do so. This will inevitably reduce the misuse of public funds thereby resulting in enhanced public service.

Using BT, in conjunction with digital identities, Zimbabwean citizens outside the country will be able to participate in the voting processes, thereby taking the country's respect for democracy to higher levels.

- **Improved Medical Services:** The use of counterfeit medicine is prevalent in Africa, and Zimbabwe is not an exception. Strict laws have proved to be ineffective in this fight. Fortunately, through the use of blockchain technology, original sources of medicines sold in pharmacies and other medical institutions can be verified beyond doubt. This will go a long way in solving a lot of forensic medical cases involving the source of medicine, and who administered that medicine.
- **Improved Food Services:** In cases of poor food quality or food poisoning, it becomes crucial to trace all the parties in the supply chain. Just like with medical services, the BT makes it easier to trace the origins of food items. In essence, this ensure quality food products right from the farm until it is in the supermarket.

4. Conclusion

Despite the development stage of the adopted blockchain, this technology has the capacity to change the lives of Zimbabweans for the better. However, the government should ensure that the citizens are well educated about this disruptive BT. In addition to reducing crypto scams in the country, crypto education will enable the Zimbabwean

citizens to take full advantage of BT. From the above benefits, it can be inferred that the Zimbabweans citizens will benefit in almost all the spheres of life. Hence, the Zimbabwean government should consider adopting this disruptive technology after extensively scrutinising all the risk factors involved with this new technology.

References

- Adrian, T. (2019). *Stablecoins, Central Bank Digital Currencies, and Cross-border Payments: A New Look at the International Monetary System*. <https://www.imf.org/en/News/Articles/2019/05/13/sp051419-stablecoins-central-bank-digital-currencies-and-cross-border-payments> [Accessed on October 20, 2021].
- Bech, M. and Garratt, R. (2017). *Central Bank Cryptocurrencies*. *Bank for International Settlements (BIS) Quarterly Review*. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3041906 [Accessed on October 20, 2020].
- Bitcoin, K.E. (2021). *Zimbabwe Finance Minister Identifies Crypto Solutions for Cheaper Diaspora Remittance Transactions*. <https://bitcoinke.io/2021/09/zimbabwe-finance-minister-talks-crypto-for-remittance/> [Accessed on October 21, 2021].
- BitDegree. (2021). *Proof of Work vs. Proof of Stake: Which One is Better?* <https://www.bitdegree.org/crypto/tutorials/proof-of-work-vs-proof-of-stake#proof-of-stake-how-are-transactions-verified> [Accessed on October 19, 2021].
- Biti, T. and Moss, T. (2016). *Op-Ed: Why Bond Notes Can't Save Zimbabwe – and What Ordinary Citizens Can Do*. <https://www.dailymaverick.co.za/article/2016-12-12-op-ed-why-bond-notes-cant-save-zimbabwe-and-what-ordinary-citizens-can-do/> [Accessed on October 21, 2021].
- Bogdanov, D. (2021). *Proof of Authority Explained*. <https://limechain.tech/blog/proof-of-authority-explained/> [Accessed on October 19, 2021].
- Bruwer, J-P., Mabesele, L., Brown, T., Charles, C., Coulter, I. and Williams, E. (2021). *The Feasibility of Plastic Bag Usage for Newly Established South African Small, Medium and Micro Enterprises Amidst Increases in Sin tax: An Online Desktop Study*. *International Journal of Business Research and Management*, 12 (4), 175-190.
- CFI. (2021). *Types of Assets: Classifying Assets Based on Convertibility, Physical Existence and Usage*.
- Chasi, F., Guramatunhu, S., Motsi, I., Mwedzi, P., Mubaiwa, K., Chiurunge, O., Chimuka, N., Sena, T. and Tomu, T. (2021). *Towards Virtual Assets Regulation and Adoption of Blockchain Technologies in Zimbabwe's Context*. Research Paper. <https://www.techzim.co.zw/2021/10/download-towards-virtual-assets-regulation-and-adoption-of-blockchain-technologies-in-zimbabwes-context/> [October 19, 2021].
- Churchill, A.G (1995). *Marketing Research Methodological Foundations*, New York: The Dryden Press.
- Clark, M. (2021). *NFTs, Explained*. <https://www.theverge.com/22310188/nft-explainer-what-is-blockchain-crypto-art-faq> *The Verge*. [Accessed on October 20, 2021].
- Coding Bootcamps. (2021). *Blockchain Evolution and Phases from Ethereum to Hyperledger*. <https://www.coding-bootcamps.com/blog/overview-of-blockchain-evolution-and-phases-from-ethereum-to-hyperledger.html> [Accessed on October 20, 2021].
- CoinMarketCap. (2021). *All Cryptocurrencies*. <https://coinmarketcap.com/all/views/all/> [Accessed on October 20, 2021].
- Crypto Wisser. (2021). *Easy crypto South Africa vs. SIGEN.pro*. <https://www.cryptowisser.com/exchange/easy-crypto-south-africa-vs-sigen-pro/> [Accessed on October 21, 2021].
- Cryptopedia. (2021). *Hot Wallets vs. Cold Wallets*. <https://www.gemini.com/cryptopedia/crypto-wallets-hot-cold> [Accessed on October 21, 2021].
- Daye, W., Guan, C., Swift, L. and Pugachevsky, D. (2021). *Understanding the Cryptoasset Market*. <https://www.quantifisolutions.com/understanding-the-cryptoasset-market> [Accessed on October 20, 2021].
- Deloitte. (2020). *Security Token Offerings: The Next Phase of Financial Market Evolution?* <https://www2.deloitte.com/content/dam/Deloitte/cn/Documents/audit/deloitte-cn-audit-security-token-offering-en-201009.pdf> [Accessed on October 20, 2021].
- DW. (2021). *Zimbabwe Steps Up Fight Against Counterfeit Medicine*. <https://www.dw.com/en/zimbabwe-steps-up-fight-against-counterfeit-medicine/a-40446278> [Accessed on October 21, 2021].
- Engadget. (2016). *How Cryptocurrencies will help the Poorest People in the World*. <https://www.engadget.com/2016-11-28-how-cryptocurrencies-will-help-the-poorest-people-in-the-world.html> [Accessed on October 21, 2021].

- Exodus. (2021). Hot vs. Cold Wallets. <https://support.exodus.com/article/931-what-are-the-different-types-of-crypto-wallets#:~:text=Examples%20of%20hot%20wallets%20include,depending%20on%20your%20security%20practices>. [Accessed on October 21, 2021].
- Exodus. (2021). What are the Different Types of Cryptocurrency? <https://support.exodus.com/article/1084-what-are-the-different-types-of-cryptocurrency#privacy> [Accessed on October 20, 2021].
- Fisher, T. (2021). What is a Node in a Computer Network? <https://www.lifewire.com/what-is-a-node-4155598> [on October 20, 2021].
- Giovetti, O. and McConville, K. (2020). How does Education Affect Poverty? It Can Help End It. <https://www.concernusa.org/story/how-education-affects-poverty/> [Accessed on October 10, 2021].
- Hanson Robotics. (2021). Sophia. <https://www.hansonrobotics.com/sophia/> [Accessed on October 20, 2021].
- Heaton, J. (2003). *Secondary Data Analysis*. The AZ of Social Research, Sage, London.
- Hodlbot. (2019). Types of Cryptocurrencies — The 4 Major Categories. <https://www.hodlbot.io/blog/types-of-cryptocurrencies> [Accessed on October 20, 2021].
- Holtmeier, M. and Sandner, P. (2019). The Impact of Crypto Currencies on Developing Countries. *Frankfurt School Blockchain Center*. http://explore-ip.com/2019_The-Impact-of-Crypto-Currencies-on-Developing-Countries.pdf [Accessed on October 21, 2021].
- Infinity Energy. (2020). What is Peer-to-Peer Energy Trading? <https://www.infiniteenergy.com.au/peer-to-peer-energy-trading/> [Accessed on October 21, 2021].
- Iredale, G. (2020). Blockchain Definition: Everything You Need to Know <https://101blockchains.com/blockchain-definition/#prettyPhoto> [Accessed on October 18, 2020].
- Jackson, A.L. (2021). Trading Crypto Usually Means High Fees, But There Are Ways To Avoid Them. <https://money.com/cryptocurrency-trading-fees-avoid/> [Accessed on October 20, 2021].
- Kraken. (2021). Types of Cryptocurrency. <https://www.kraken.com/learn/types-of-cryptocurrency> [Accessed on October 20, 2020].
- Lee, D.K.C. and Teo, E.G.S. (2020). The New Money: The Utility of Cryptocurrencies and the Need for a New Monetary Policy. *Social Science Research Network (SSRN)*. <https://ssrn.com/abstract=3608752> [Accessed on October 21, 2021].
- Leornado ENERGY. (2019). Peer-to-Peer Energy Trading and Community Self-Consumption. <https://www.youtube.com/watch?v=ZDXX2kryTD4> [Accessed on October 21, 2021].
- Levine, A.B. (2021). Using Bitcoin in Zimbabwe, Part 3 of a Six-Part Documentary Podcast Series. <https://www.coindesk.com/markets/2020/04/02/using-bitcoin-in-zimbabwe-part-3-of-a-six-part-documentary-podcast-series/> [Accessed on October 20, 2021].
- Loshin, P. and Cobb, M. (ed). (2021). Definition of Encryption. *SearchSecurity* <https://searchsecurity.techtarget.com/definition/encryption> [Accessed on October 20, 2021].
- Masama, B. and Bruwer, J.P. (2021). The Feasibility of Blockchain Technology As a Tool for Zimbabwean Financial Inclusion: An Online Desktop Review. *Social Science Research Network (SSRN)*. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3946006 [Accessed on October 21, 2021].
- Miller, B. (2017). Can Blockchain Bring Voting Online? <https://www.govtech.com/data/gt-october-november-securing-the-vote.html> [Accessed on October 21, 2021].
- Miracle Consultants. (2021). Mission. <https://miracleconsultants.com/> [October 10, 2021].
- Nakamoto, S. (2008). Bitcoin: A Peer-to-Peer Electronic Cash System. <https://bitcoin.org/bitcoin.pdf> [Accessed on October 18, 2021].
- NDTV. (2021). How Will Cryptocurrency Change The Existing Global Economic Order? <https://www.ndtv.com/business/can-cryptocurrency-change-the-global-economy-2560228> [Accessed on October 21, 2021].
- Newsday. (2021). Push for Digital Currency Gains Traction. <https://www.newsday.co.zw/2021/08/push-for-digital-currency-gains-traction/> [Accessed on October 21, 2021].

- Panetta, K. (2019). *The 4 Phases of the Gartner Blockchain Spectrum. Understand the 4 phases of Blockchain Evolution and Explore Potential Business Opportunities.* <https://www.gartner.com/smarterwithgartner/the-4-phases-of-the-gartner-blockchain-spectrum> [Accessed on October 20, 2021].
- Popper, N. (2021). *Lost Passwords Lock Millionaires Out of Their Bitcoin Fortunes.* *The New York Times.* <https://www.nytimes.com/2021/01/12/technology/bitcoin-passwords-wallets-fortunes.html> [Accessed on October 20, 2021].
- PWC. (2015). *Blockchain – An Opportunity for Energy Producers And Consumers?* <https://www.pwc.com/gx/en/industries/assets/pwc-blockchain-opportunity-for-energy-producers-and-consumers.pdf> [Accessed on October 21, 2021].
- Quantifi. (2021). *Understanding the Cryptoasset Market.* <https://www.quantifisolutions.com/understanding-the-cryptoasset-market> [Accessed on October 18, 2021].
- RBZ. (2017). *Use of Virtual Currencies in Zimbabwe.* <https://www.rbz.co.zw/documents/publications/press/press-statement—use-of-virtual-currencies-in-zimbabwe.pdf> [Accessed on October 18, 2021].
- RBZ. (2018). *Circular to Banking Institutions No. 2/2018: Virtual Currencies.* <https://www.rbz.co.zw/documents/publications/circulars/circular-to-banking-institutions-operations-of-cryptocurrency-exchanges-11-may-2019.pdf> [Accessed on October 19, 2021].
- Rodriguez. (2021). *5 Best Crypto Wallets of 2021.* <https://money.com/best-crypto-wallets/> [Accessed on October 21, 2021].
- SearchSecurity. (2021). *Definition of Autonomous.* <https://whatis.techtarget.com/search/query?q=autonomous> [Accessed on October 20, 2021].
- Shaik, K. (2018). *The Top 10 Blockchain Skills You Need to Develop.* <https://www.ibm.com/blogs/blockchain/2018/03/the-top-10-blockchain-skills-you-need-to-develop/> [Accessed on October 20, 2021].
- Sharma, T.K. (2021). *Types of Crypto Wallets Explained.* <https://www.blockchain-council.org/blockchain/types-of-crypto-wallets-explained/> [Accessed on October 21, 2021].
- Shumba, C. (2021). *Cryptocurrencies are Taking the Developing World by Storm, with More Users now in Nigeria than in the US - 2 Experts Lay Out How Bitcoin is Changing Emerging-Market Finance.* <https://markets.businessinsider.com/news/currencies/cryptocurrencies-are-taking-the-developing-world-and-nigeria-by-storm-2021-7> [Accessed on October 21, 2021].
- Skrill. (2021). *What Cryptocurrencies Could Bring To Developing Countries.* <https://www.skrill.com/en/skrill-news/cryptocurrency/cryptocurrency-developing-countries/> [Accessed on October 21, 2021].
- Soto, E.A., Bosman, L.B., Wolega, E. and Leon-Salas, W.D. (2021). *Peer-to-Peer Energy Trading: A Review of the Literature.* *Applied Energy*, 283.
- Statista. (2021). *Number of Cryptocurrencies Worldwide from 2013 to October 2021.* <https://www.statista.com/statistics/863917/number-crypto-coins-tokens/#statisticContainer> [Accessed on October 21, 2021].
- Tan, W.S. (2020). *Bitcoin, Grandfather of Cryptocurrency vs USD, Grandfather of Fiat Economy.* <https://www.linkedin.com/pulse/bitcoin-grandfather-cryptocurrency-vs-usd-fiat-economy-woei-shin-tan/> [Accessed on October 20, 2021].
- The Borgen Project. (2021). *The Benefits of cCryptocurrency in Nigeria.* <https://borgenproject.org/cryptocurrency-in-nigeria/> [Accessed on October 21, 2021].
- Thomas, R. (2021). *What does HODL mean in crypto?* <https://theface.com/life/what-is-hodl-cryptocurrency-meme-finance-digital-bitcoin> [Accessed on October 20, 2021].
- UMI. (2021). *DeFi Market Entry Manifest.* https://umi.top/OneApp_en.pdf [Accessed 21 October 2021]. Victor, M. *Trading on a CEX vs. DEX. What's the difference and what are the risks?* <https://trustwallet.com/blog/trading-on-cex-vs-dex> [Accessed on October 21, 2021].
- Voigt, K. (2021). *What is Cryptocurrency? Here's What You Should Know.* <https://www.nerdwallet.com/article/investing/cryptocurrency-7-things-to-know> [Accessed on October 21, 2021].
- Wheatley, J., Klasa, A., Munshi, N. and Pooler, M. (2021). *Cryptocurrencies: Developing Countries Provide Fertile Ground.* <https://www.ft.com/content/1ea829ed-5dde-4f6e-be11-99392bdc0788> [Accessed on October 20, 2021].

- World Bank. (2021). Average Transaction Cost of Sending Remittances to a Specific Country (%) – Zimbabwe. <https://data.worldbank.org/indicator/SI.RMT.COST.IB.ZS?locations=ZW> [[Accessed on October 21, 2021].
- Yori, J. (2021). Security Tokens are Back and this Time it's Real. <https://www.coindesk.com/business/2021/06/30/security-tokens-are-back-and-this-time-its-real/> [Accessed on October 20, 2021].
- Zeng, H., Guan, C., Daye, W. and Cheema, S. (2021). Part1: Blockchain Technologies. <https://www.quantifisolutions.com/blockchain-technologies-in-financial-markets> [Accessed on October 20, 2021].

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