The World's Largest Open Access Agricultural & Applied Economics Digital Library

This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.

Help ensure our sustainability.

Give to AgEcon Search

AgEcon Search
http://ageconsearch.umn.edu
aesearch@umn.edu

*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*

No endorsement of AgEcon Search or its fundraising activities by the author(s) of the following work or their employer(s) is intended or implied.

AJLP & GS
African Journal on Land Policy and Geospatial Sciences

e-ISSN : 2657-2664, Vol. 7, Issue.2, March 2024

https://revues.imist.ma/index.php/AJLP-GS/index

https://doi.org/10.48346/IMIST.PRSM/ajlp-gs.v7i2.41704 *Category of the manuscript : Articles*

***Received in**:* 2 August 2023 **Revised in:** 4 March 2024 ***Accepted in**:* 4 March 2024

Possibility of land ownership transaction with non-fungible token technology

Minting survey plan

[1]Kolawole Samuel Ilesanmi and [2]Timothy Oluwadare Idowu

[1]Department of Surveying and Geoinformatics, Ajayi Crowther University Oyo, Nigeria.

Emails:
[1]*ks.ilesanmi@acu.edu.ng*

[2]Department of Surveying and Geoinformatics, Federal University of Technology, Akure, Nigeria

Emails:
[2]*toidowu@futa.edu.ng*

[1]*Corresponding Author*

ABSTRACT

Context and background:
The blockchain technology is as a new technology in vogue that is virtually getting a swift application in most important art world transactions. This is due to its public distributed, transparent, accountable, traceable and safe, ledger database, also is the advantage to secure a successful transaction without a third party. As the world keeps growing in the knowledge and the adoption of the technology, it is very important to practically explore the opportunities in this technology to combat the security and copyright problems facing land ownership transactions in the Cadastre system.

Goal and Objectives:
The goal of this paper is to practically access the possibility of engaging the blockchain technology in land administration and ownership systems while the objective is to convert legal instrument(s) into cryptographic readable data.

Methodology:
This was done by minting survey plans template into Non-Fungible Token. Two blockchains (Solana and CORE blockchains) were considered to show the possibility of adopting the technology in land administration and ownership systems. The selection was based on their flexibility, Scalability and the potentials to solve the trilemma blockchain problems. A survey plan template called DEMO (no real) was created for this purpose. Transactions on the FONE network Art NFT marketplace built on Solana blockchain was examined while an art NFT of survey plan template was minted on the Youngparrot NFT marketplace built on CORE blockchain.

Results:
The transactions were completed and the survey plan was successfully minted on the Core blockchain. the minting and transaction records are available and can be traced on the public blockchain ledger. Due to this advantage, this paper urges the consideration to take advantage of the possibilities and positivity of the technology in Land Administration sector and land ownership system and also provides steps to achieving its successful adoption. In addition, this is not a financial advice but a research work.

Keywords:

Survey Plan, Art Non-Fungible Token, Land Ownership Transaction, CORE Blockchain, YoungParrot.

1. INTRODUCTION

Cadastre system of a country is the system of land ownership and land use recognized by the said country. The system(s) of land administration rely on some important aspects, like the cadastre system, the town planning system and of course, the law and regulation guiding its implementation. Krigsholm et'la (2019), the role of cadastral system is to act as the 'where' component of property rights system by providing accurate information of real property units, their location and interests related to them. This requires a cadastral survey plan.

Cadastral surveying is a branch of surveying that deals with capturing (measuring) landed properties presented on plans drawn to scale for registration of ownership purposes. To think of the effectiveness of implementing the laws for and effective land administration, one cannot leave behind the necessity to discuss its monetary implications, the mode/means of transaction and the validation of such transactions. Land ownership as a result is the ability to proof such with evidence(s) beyond form a third party.

Cadastre system of a country is based on a centralized database maintained by a government / public authorities, which in no doubt is an effective means of administering land. However, this system of land administration has its own loop holes which are often exploited by people due to its lack of a well-structured and designed digital database that can stand the test of time. Also are the issue of little or no public sensitization programmes and the problem of security facing land transactions via buying and selling of land and landed properties. Amidst these challenges, and the search to address them, is the question; this is to address the question; how practicable is land ownership transaction on blockchain network (Muller and Seifert, 2019)

To address the major challenges facing Land ownership, there is a need to look into the possibility of performing such transactions on the blockchain technology, the validation of such transactions and making the information of such transactions available to the public anywhere and at any time. In place of the current system of land transaction and validation system, the blockchain technology presents the NFT means of transaction as a solution. This technology is recommended as a digital means to counter copyright infringement and improve safety of digital assets which survey plans can also take advantage of by using the Non-Fungible Token (Kim; 2021, Muller and Seifert; 2019).

The aim of this work is to practically present the possibility of transacting land ownership on blockchain network using NFTs while the objective is to create and mint a survey plan template into an art NFT ready for transaction, considering the fact that surveying is all together a science, art and technology. At successfully minting the survey plan template as NFT, the minting transaction details were recorded on the blockchain network. This practically shows the possibility of transacting land and landed properties on the blockchain technology. Also, could also be an important means of opposing the barriers generally facing Land Administration. Art and Geoinformation as parts the important characteristics features of Surveying and Geoinformatics presents an opportunity of exploring the digital art space of an NFT to solve the earlier said problems.

2. BACKGROUND STUDY

Sakiz and Gencer (2021), blockchain is a decentralized database and an emerging computing and development platform. In this age, the blockchain technology is not a new idea. Since the introduction

of the technology in 2008 (Hussain et'al; 2022) by Satoshi Nakamoto, improvements on the technology has been commendably remarkable, and as the maturity of technology evolves, more solutions based on blockchains will become possible. He introduced both Blockchain Technology and Bitcoin defining how a decentralized and distributed public ledger based on cryptography can be accumulated into a digital application (Hussain et'al; 2022). Today the concept of blockchain technology has evolved beyond digital exchange and finance only.

Transactions on a blockchain are processed by computers which work together on a public or private network and every transaction should be confirmed. All transactions is secured on the blockchain, it processes all transactions in blocks. Each of the blocks is linked to the previous block and that makes it impossible to change and alter a transaction. Moreover, this is a transparent architecture because each computer called node in the network has a record of every single transaction that has been confirmed (Sakiz and Gencer; 2021).

The advantages of the technology include, time conservation, transparency and the security it guarantees. Transaction records on the blockchain only be additive, records cannot be altered, deleted or muted. Cryptocurrencies have gained much attention from the experts of financial and technical sectors and academic world recently (Muller and Seifert; 2019).

Since the introduction of Bitcoin blockchain in 2009, the world has been diverting into the adoption of blockchain for their transactions by creating new, easy, fast and cost effective blockchain (as listed in Table 1 below) that can accommodate diverse applications and utilities.

S/N	**Name**	**Price ($)**	**Total Supply**	**Market Cap ($)**
1	Bitcoin (BTC)	30,600.01	19,418,793 BTC	594.72B
2	Ethereum (ETH)	1,960.10	120,219,234 ETH	236.12B
3	Tether (USDT)	1	83,341,708,027 USDT	83.34B
4	Binance (BNB)	247.86	155,850,872 BNB	38.67B
5	USD Coin (USDC)	1	27,340,559,886 USDC	27.36B
6	XRP (XRP)	0.4852	52,254,289,650 XRP	25.25B
7	Cardano (ADA)	0.2929	34,952,288,293 ADA	10.27B
8	Dogecoin (DOGE)	0.06751	140,021,546,384 DOGE	9.47B
9	Litcoin (LTC)	109.50	73,281,114 LTC	8B
10	Solana (SOL)	19.36	400,893,240 SOL	7.65B

Table 1: Top 10 Cryptocurrencies on Coin Market Cap. (https://coinmarketcap.com/)

Some of the coins are stable coins (BUSD, USDC and USDT), some are costly (BTC and ETH), cheap and affordable (Binance, CORE) while some like the likes of Pi Network, Satoshi, Alpha, EGON, Star Blockchain MainNets are set to be launched.

In the last 2 years, the application of blockchain technology has gained its stand to promote Anti-Copyright Infringement in art and designs using Non Fungible Token (NFTs). As the technology keeps improving with the introduction of new, cost effective and friendly Blockchain Networks, newly introduced features, like the Proof of Work (PoW), Proof of Stake (PoS), Delegated Proof of Stake (DPoS), the Consensus Mechanism etc, are making the technology more compatible for adoption and application in different fields of study.

To add to the lists of notable remarks is the smart contract standards on Ethereum blockchain for instance is the ERC-20, which is a technical standard used for all smart contracts on the Ethereum and enables creation of fungible tokens implementations. Also are the ERC-721 and ERC 1155 token standards for the creation of non-fungible tokens (NFTs) (Kim; 2021, Ali and Bagui; 2021). Fungible tokens (FT) can be divided but Non-Fungible tokens (NFTs) are unique and cannot be divided. NFTs provides proof of ownership over physical or digital assets. With NFTs, any digital artwork can be "tokenised" to create a digital certificate of ownership that can be transacted on blockchain (Sakiz and Gencer; 2021).

2.1 Solana and CORE Blockchain

Solana Blockchain is a blockchain platform which uses a proof-of-stake mechanism to provide smart contract functionality. The native Cryptocurrency is SOL (Wikipedia, 2023). Though, the mechanism is similar to the Ethereum blockchain, it is considered an alternative because, transactions of the Solana blockchain are cheaper, cost effective and its saves time to confirm transactions on the blockchain. The Solana Blockchain makes the 9th blockchain on the Coin Market Capitalization (Chez, 2023).

The value of Solana tokens has fluctuated greatly since the system's inception due to its ability to build on the shortcomings of previous blockchain like Bitcoin and Ethereum. In 2021, its rose up by 12,000%, from $63 billion to $74 billion market capitalization. On 11 June 2023, it dropped by 30%. The Solana blockchain had experienced several notable outages in service since 2021 (Wikipedia, 2023).

Core is an independent blockchain designed to operate at the core of Web3. At mainnet launch on 8th February 2023, Core is powered by the Satoshi plus consensus mechanism which synegyzes the Bitcoin Mining hashrate with the Ethereum Virtual Machine (EVM). In other words, it is set to ensure an optimum security, scalability and decentralization by combining Proof-of-Work (PoW) with Proof-of-Stake (PoS). The native cryptocurrency (i.e. base layer currency) is CORE (Cryptoslav, 2023).

2.2 Non-Fungible Tokens (NFTs)

Kim (2021), NFT is a kind of virtual asset which cannot be exchanged on 1:1 value ratio but each token has a different unique value ascribed to each asset. NFT authenticates the uniqueness of digital assets via a series of unique data stored in the blockchain so that it can have rarity. This therefore is a good technology to fight theft, plagiarism and any art fraudulent acts, of which survey plans and maps can be included. NFT platforms and marketplaces accepts arts in JPG, JPEG, PNG, GIF, SVG, MP3, MP4, WEBM, OGG, MOV, WAV, GLB, GLTF formats of maximum size of 100MB. The acceptance of

scalable vector graphics (SVG) and pictures (JPG and JPEG) presents the opportunity for surveying and geoinformatics profession to explore the relevant possibilities of the blockchain technology.

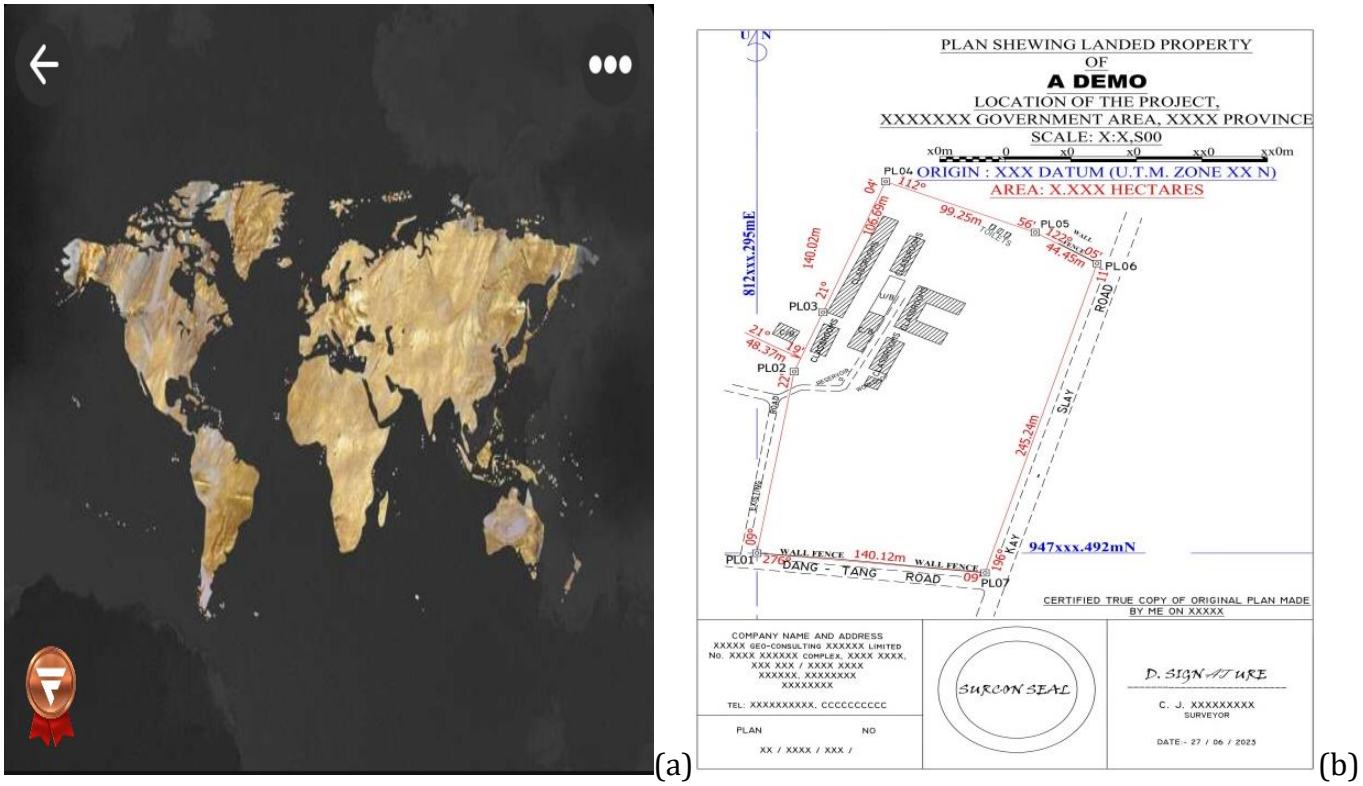
3.0 METHODOLOGY

The main advantages of adopting NFTs in land administration system are, to be able to conduct transaction on the blockchain in little or no time at an affordable price, to be able to combat Cyber-insecurity and the ability to monitor and maintain open ledger transactions (Ibrahim et'al; 2021).

The method adopted for the land ownership transfer and transaction was a digital/electronic Art transaction based on blockchain technology. Two different NFT Marketplaces were used. A world art and a cadastral plan prepared as a digital art was minted into NFTs on FONE and YoungParrot NFT marketplace, which was developed on Solana and CORE a cryptographic Blockchain respectively. Minted NFTs always have a unique NFT hash which is a unique digital code that carries the genuineness and specific digital prints of the art creator.

A. Data Acquisition and Quality

Two sets of image data were used. One is the image of the continents (titled "world") while the other is a template of survey plan (titled "Research Demo"). The research demo is not a real survey plan; it was prepared only for the purpose of this work



(a) (b)

Figure 1: Image Data. (a) World; FONE Art NFT Gallery, (b) Research Demo

B. Minting Plan to NFT

Most of the survey plans of landed properties are usually in hard copies, if not an assumption, and it is only important to have such in a computer readable format. Most importantly in the format

acceptable by the selected blockchain which can be JPG, SVG e.t.c. To mint the plan into NFT on a Blockchain, the steps involved are as follow;

1. Determine a NFT marketplace and the Cryptographic blockchain of interest. In this case, the FONE and YoungParrot Marketplaces;
2. Create a collection account on the desired market place;
3. Validate and confirm the created NFT collection account;
4. Converted the survey plan into an electronic format acceptable by the NFT blockchain JPG, JPEG, PNG, GIF, SVG, MP3, MP4, WEBM, OGG, MOV, WAV, GLB, GLTF formats of less than of 100mb size;
5. Select the NFT categories you which to mint (Art NFT category in the case);
6. Mint the art into a Non-Fungible token on a Blockchain; ascribing NFT Name (Demo2), descriptions, metadata and required information. This also includes the percentage you would like to earn whenever the buying wishes to re-sell again.

It is important to note that transactions on a blockchain are paid for with the native token on the blockchain; in this case, core. Should you wish to showcase the plan as a sale advert, it would be displayed on the gallery as an NFT Art either for sale or for advertisement after publishing it for sale on the marketplace.

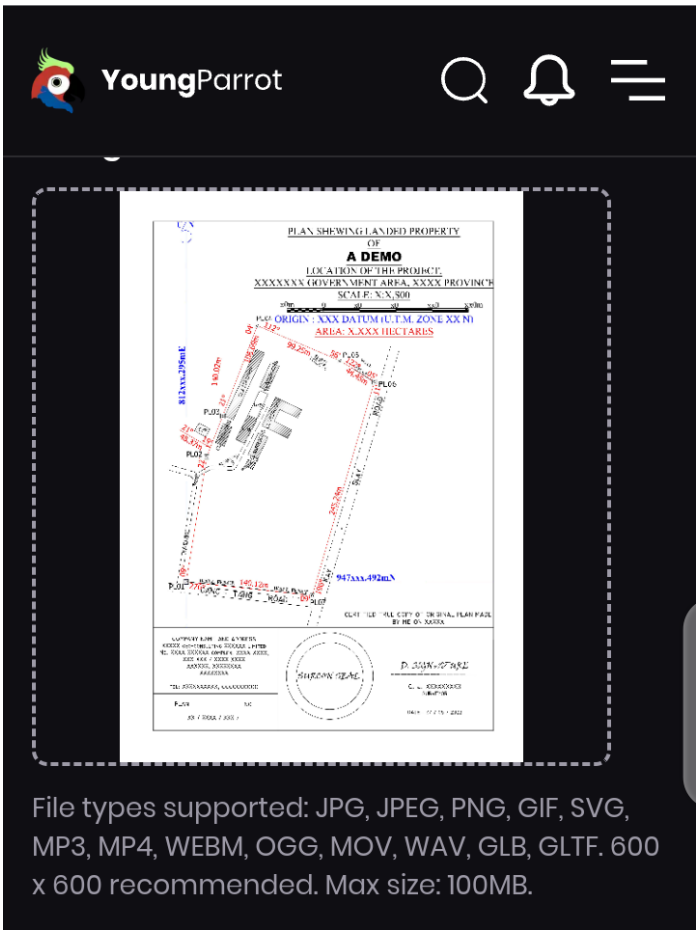
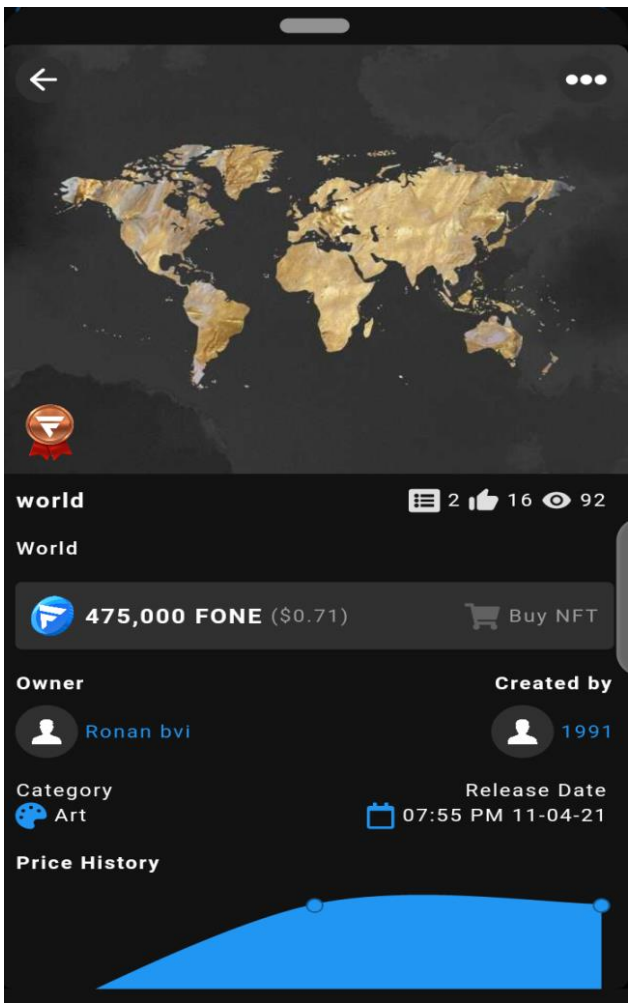


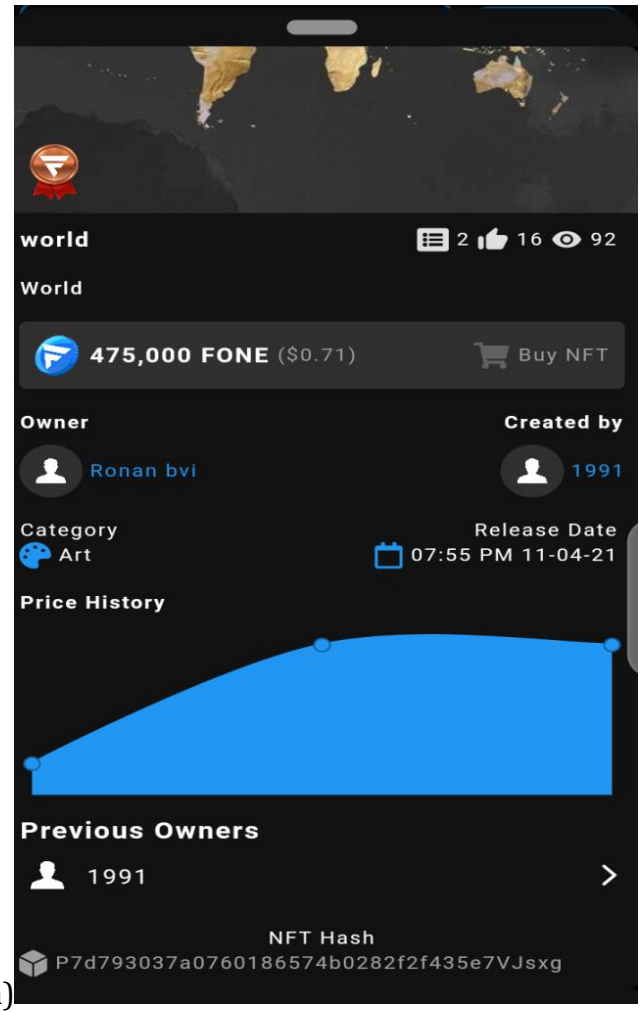
Figure 2: Minting Plan into an NFT

4. RESULTS AND DISCUSSION

The results of the transactions of the two samples (world art and survey plan) is analysed and discussed hence. One of the advantages of a blockchain technology is its transparency and openness, the ability to view all transactions on a blockchain ledger. The First NFT Art transaction to be discussed is an art piece titled "WORLD". The art NFT was created and owned (initially) by an account called 1991 with a release date of 11/04/21 at 07:55pm. Later, the piece of "World" Art was bought by an Account on the same blockchain called Ronan bvi. Since the purchase, Account 1991 is no longer the owner but Ronan bvi, as registered on the blockchain. However, the blockchain ledger still has it on record that Account 1991 was the creator and previous owner.



(a)



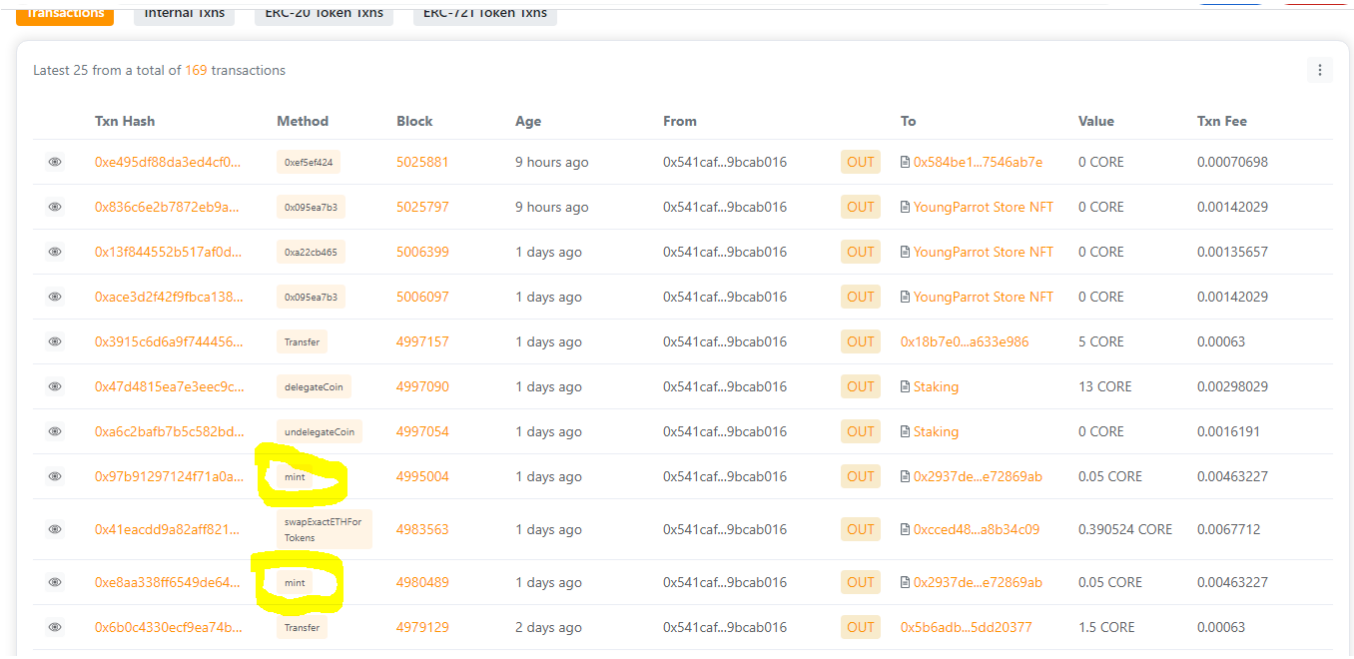
(b)

Figure 3(a) and (b): NFT Transaction Record on FONE Network

The NFT Hash; P7d793037a0760186574b0282f2f435e7VJsxg is the digital signature of the genuine World art NFT which belongs to Ronan bvi as at the time of compilation.

An NFT transaction was performed on the Youngparrot NFT market place using a false prepared survey plan template. An Account was developed on Youngparrot NFT marketplace with Genesis12v3 as username. The NFT account was verified and confirmed on the CORE blockchain. The survey plan was converted to digital/JPG format and minted into an NFT. The transactions can be viewed publicly on the CORE blockchain by searching for the wallet address of the account on the https://www.scan.coredao.org.

The minting can also be tracked on the ledger by using the transaction hash 0xe8aa338ff6549de649eda87cf4463af06f69012fedc7a2e52f973a23abdda377.



Transactions | Internal Txns | ERC-20 Token Txns | ERC-721 Token Txns

Latest 25 from a total of 169 transactions

Txn Hash	Method	Block	Age	From		To	Value	Txn Fee
0xe495df88da3ed4cf0...	0xef5ef424	5025881	9 hours ago	0x541caf...9bcab016	OUT	0x584be1...7546ab7e	0 CORE	0.00070698
0x836c6e2b7872eb9a...	0x095ea7b3	5025797	9 hours ago	0x541caf...9bcab016	OUT	YoungParrot Store NFT	0 CORE	0.00142029
0x13f844552b517af0d...	0xa22cb465	5006399	1 days ago	0x541caf...9bcab016	OUT	YoungParrot Store NFT	0 CORE	0.00135657
0xace3d2f42f9fbca138...	0x095ea7b3	5006097	1 days ago	0x541caf...9bcab016	OUT	YoungParrot Store NFT	0 CORE	0.00142029
0x3915c6d6a9f744456...	Transfer	4997157	1 days ago	0x541caf...9bcab016	OUT	0x18b7e0...a633e986	5 CORE	0.00063
0x47d4815ea7e3eec9c...	delegateCoin	4997090	1 days ago	0x541caf...9bcab016	OUT	Staking	13 CORE	0.00298029
0xa6c2bafb7b5c582bd...	undelegateCoin	4997054	1 days ago	0x541caf...9bcab016	OUT	Staking	0 CORE	0.0016191
0x97b91297124f71a0a...	mint	4995004	1 days ago	0x541caf...9bcab016	OUT	0x2937de...e72869ab	0.05 CORE	0.00463227
0x41eacdd9a82aff821...	swapExactETHFor Tokens	4983563	1 days ago	0x541caf...9bcab016	OUT	0xcced48...a8b34c09	0.390524 CORE	0.0067712
0xe8aa338ff6549de64...	mint	4980489	1 days ago	0x541caf...9bcab016	OUT	0x2937de...e72869ab	0.05 CORE	0.00463227
0x6b0c4330ecf9ea74b...	Transfer	4979129	2 days ago	0x541caf...9bcab016	OUT	0x5b6adb...5dd20377	1.5 CORE	0.00063

Figure 4: Minting record on the CORE blockchain (source: https://www.scan.coredao.org.)

The CORE scan is the ledger that consists of all transactions on the CORE blockchain. It shows the transaction accounts (payer and payee) time/age and method of transaction, transaction block, amount paid and the payment status.

The Minted NFT is published on the network blockchain for sale. Once any interested person purchases the NFT, the identity of ownership of the NFT automatically changes to the new owner's. The blockchain still recognizes the creator of the NFT but the new owner becomes the legal/rightful owner of the purchased NFT.

The transparency and data security of transactions on blockchain networks is one of the strong holds of this new technology. As presented in the above ledger record, the details of every transaction cannot be altered at any time due to the regimented nature of blockchain smart contracts (Ali and Bagui; 2021). With this, the originality and prove of ownership of land and landed properties can secured and preserved via this technology.

5. CONCLUSION

The study has successfully made an attempt to mint a survey plan template into an NFT on the Youngparrot NFT marketplace built on CORE blockchain. The blockchain was developed to support decentralization, scalability and security through the Satoshi Plus Consensus (Liu, 2023). The Non-Fungible Token is an important part of the blockchain technology that promises to be of a great support and a form of solution to the problems of land administration and ownership system.

As the knowledge in blockchain technology keeps increasing, it is only imperative that the land administration sector of a country harness its potentials. It is recommended that an NFT platform / marketplace purposely built for land administration and ownership transaction is developed and built on a reliable, secured, cost effective blockchain transaction. This is a way at which land

transaction issues can be solved and a well-structured database that can stand the test of time is developed. Also, all the viable possibilities in other blockchain networks should be harnessed towards a successful development of a hitch free land administration blockchain.

However, there is a need to synergize this method with the peculiarities of land transaction and ownership related matters and the roles of countries' regulatory bodies and government offices involved. Also, it is worthy of note to advice everyone to always "do your own research" (dyor) on crypto and blockchain related matters.

6. ACKNOWLEDGMENT

All thanks to God the Almighty. My appreciations to Prof. Surv. T. O. Idowu (my Supervisor), Prof. Surv. O. Kufoniyi (my Head of Department), Mrs. A. M. Ilesanmi (Wife), Eld. and Deaconess Ilesanmi (Parents) and my fellow colleagues.

7. FUNDING:

– NO FUNDING -.

8. AUTHOR CONTRIBUTIONS:

Kolawole Samuel Ilesanmi, : Investigator and Writer.

Timothy Oluwadare Idowu, : reviewer and supervisor.

9. REFERENCES

Ali, M. & Bagui, S. (2021); Introduction to NFTs: The Future of Digital Collectibles. *International Journal of Advanced Computer Science and Applications*. Vol. 12, No. 10. Pages 50-56

Chez, B. (2023). Coin Market Capitalization. Retrieved from https://coinmarketcap.com/. *2nd July, 2023.*

Cryptoslav, I. (2023). What Is Core DAO? Features and Tokenomics. Retrieved from https://coinmarketcap.com/alexandria/article/what-is-core-dao-features-and-tokenomics. Last visit, 22nd July, 2023.

Hussain, A. A., Md. Emon, A., Tanna, T. A, Emon, R. I & Md. Onik, M. H. (2022); A Systematic Literature Review of Blockchain Technology Adoption in Bangladesh. *Annals of Emerging Technologies in Computing (AETiC)*. Vol. 6, No. 1. DOI: 10.33166/AETiC.2022.01.001.

Ibrahim, I., Daud D., Azmi, F. A. M., Noor, N. A. M., & Yusoff, N. S. M. (2021); Improvement of Land Administration System In Nigeria: A Blockchain Technology Review. *International Journal of Scientific & Technology Research*. Volume 10, Issue 08. Pages 33-39.

Kim, C. G. (2021); A Study on Technology to Counter Copyright Infringement According to NFT Transaction Types. *Journal of the Semiconductor & Display Technology,* Vol. 20, No. 4. Pages 187-191.

Krigsholm, P., Ridanpää, K. & Riekkinen, K.,(2019). Blockchain as a Technological Solution in Land Administration: What are Current Barriers to Implementation?. *Paper Presented at the FIG Working Week 2019 Geospatial information for a smarter life and environmental resilience Hanoi, Vietnam.*

Liu, R. (2023). Core DAO Is Using Bitcoin to Solve the Blockchain Trilemma. Retrieved from https://blockworks.co/news/core-dao-solve-blockchain-trilemma. 11th July, 2023.

Muller, H. & Seifert, M. (2019). Blockchain, a Feasible Technology for Land Administration. *Paper Presented at the FIG Working Week April 22-26, 2019 Geospatial information for a smarter life and environmental resilience Hanoi, Vietnam.*

Sakiz, B. & Gencer, A. H. (2021). Blockchain Beyond Cryptocurrency: Non-Fungible Tokens. *International Conference on Eurasian Economies*. (Pages 144-151) Istanbul, Turkey.

Wikipedia (2023). Solana: Blockchain Platform. Retrieved from https://en.wikipedia.org/wiki/Solana_(blockchain_platform). 7th July, 2023..

9. ADDITIONAL READING

CoreDAO (2023). Core Explorer. https://www.scan.coredao.org. Last visit, 22nd July, 2023.

Patil M. (2020). Land Registry on Blockchain. *Master's Theses and Graduate Research*. San Jose State University. California, United States.

Eder G. (2019). Digital Transformation: Blockchain and Land Titles. *2019 OECD Global Anti-Corruption and Integrity Forum.* OECD Conference Centre, Paris, France.

10 KEY TERMS AND DEFINITIONS

Survey Plan: a legal document that describes and presents or shows the measurement and dimension of boundary of a parcel of land or landed property at a scale.

Art Non-Fungible Token: a unique digital Art identifier that is recorded on a blockchain, and is used to certify ownership and authenticity of Arts.

Land Ownership Transaction: possessing the ownership of land and landed properties by the process of buying or selling.

CORE Blockchain: a decentralized blockchain built on the combination of both Bitcoin and Ethereum blockchain network.

YoungParrot: An NFT marketplace built on Core blockchain for transaction NFTs