DIGITAL STOCKS USING BLOCKCHAIN TECHNOLOGY THE POSSIBLE FUTURE OF STOCKS?

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ABSTRACT

Bitcoin is the first and most successful digital currency in the world. It trends in the news almost daily, with glowing reviews of the many benefits of an alternative and international currency. This paper explains the innovative aspect of the technological platform used to transfer Bitcoin from one party to another. This technology is called the Blockchain. The Blockchain eschews a bank or other intermediary and allows parties to transfer funds directly to one another, using a peer-to-peer system. This disruptive technology has done for money transfers what email did for sending mail — by removing the need for a trusted third party just as email removed the need for using the post office to send mail. This technology mainly used for peer-to-peer money transfers, can also be extended to accomplish other forms of transfers. Blockchain technology can be used to buy and sell stocks. Real world stocks can be tokenized into digital stocks which can be easily transferred using peer-to-peer. These digital stocks act similar to digital currency whose price is real time and fluctuates. Stocks exchanged completely peer-to-peer could resolve many of the issues facing the stock market today, including high frequency trading and short sales.

Keywords: Blockchain, Digital Stocks, Stock Exchange, Tokenization, Digital Currency, Cryptocurrencies.

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1. INTRODUCTION

Since the 17th century when the Dutch East India company was the first listed company on a stock exchange, the world's economy was built around and relies upon stock exchanges where millions of trades are performed every day helping companies raise their value [1]. A stock exchange market is an aggregation of buying and selling offers corresponding to an asset. An asset can represent equities or stocks of companies, bonds, or other securities. People who buy or sell the assets are called investors while the persons who perform the transactions are called brokers or traders.

Modern stock exchanges are highly computerized and can handle vast number of transactions in a short amount of time, assuring the security, execution and authenticity of

transactions at a cost of a transaction fee, usually directly proportional with the value of the auction. The stock exchange like New York Stock Exchange, London Stock Exchange promotes buying and selling of equities of companies through the stock exchange which is regulated by a central authority. The traditional stock markets are implemented in a centralized application that gathers all the trading actions. This architecture has many benefits by having a central authority that ensures the authenticity, security and validity of the transactions. However, the centralization has also a lot of drawbacks, such as having a single point of failure, a possible performance bottleneck or susceptibility to attacks and time consuming. Furthermore, the central authority charges a fees and there is a lack of transparency of the auctioning process for the trader.

This paper explains about digital stocks that are basically tokenization of real world stocks onto equities tokens that can be easily sent across through a blockchain from one peer to another. Bitcoins[2], ethereum, ripple are famous digital currencies that allow easy buying and selling anywhere in the world. This concept of digital currencies inspired the creation of digital stocks. This would involve making use of a decentralized stock exchange [3] architecture to tackle the shortcomings identified above by using the new and emergent blockchain technology. The potential of the blockchain system can bring benefits to the entire system, the execution of the market orders and the correct settlement between the accounts. Furthermore, the ensured immutability of the ledger brings a valuable advantage with respect to the centralized system. Also, by decentralizing the system, there is no central authority or intermediate needed for placing and executing the orders. This allows peer-to-peer transfer of stocks and direct buy and sell of equities between the traders without a need of third party to intermediate the trade. This reduces the transaction cost occurred on each trade, time needed for transaction would be significantly reduced and provides enhanced security as well as transparency.

2. THE BLOCKCHAIN

2.1. The definition of the Blockchain technology

“The blockchain is an incorruptible digital ledger of economic transaction that can be programmed to record not just financial transactions but virtually everything of value” – this statement is one of the most popular definition of the blockchain, which is developed by Don and Alex Tapscott.

The technology behind various digital currencies is blockchain [4]. Bitcoin is a digital currency. Bitcoin does not exist in a physical form like various currencies and coins made out of metal and paper. It instead is stored in e-devices and secondary storage devices such as hard disk, etc in digital form. This digital form acts as a advantage, allows them to be stored, transferred, bought, and sold completely online, using the blockchain. These transactions can be performed completely peer-to-peer, meaning without the assistance and verification of a trusted third party, such as a bank.

2.2. The ABC's of Blockchain

2.2.1. Transparency and Anonymity

The prime reason blockchain is intriguing and attractive to businesses is that this technology is almost always open source. This means other users or developers have the opportunity to modify it as they see fit. But what's most important about it being open source is that it makes altering logged data within a blockchain incredibly difficult. Since a blockchain is a network of users, someone is probably going to notice if any data has been altered. This makes blockchain a particularly secure technology.

2.2. 2. Reduced transaction costs

Blockchain allows peer-to-peer and business-to-business transactions to be completed without the need for a third party, which is often a bank. In the case of equities, there will be no need of brokers or stock exchanges to buy and sell. Since there is no need of any middleman or third party that acts as an intermediate involvement tied to blockchain transactions, it means they can actually reduce costs to the user or businesses over time. The brokers charge a percentage of the assets involved in trade or transaction as fee which could be substantially reduced if it was directly bought and sold from the buyer and seller.

2.2. 3. Faster Transaction Settlements

For traditional banks and stock exchanges, it is very common for transactions to take days to completely settle. This is mainly because of protocols defined in bank and stock transferring software, as well as the fact that financial institutions are only open during normal business hours, five days a week. Also the fact that the various financial institutions are located in various time zones around the world, can delay processing times. Comparatively, blockchain technology is working 24 hours a day, seven days a week, meaning blockchain-based transactions process considerably more quickly.

2.2. 4. Decentralization

Another central reason blockchain is so useful is its lack of a central data hub. In traditional stock exchanges and banks a massive data center is employed and verify transactions through that hub, blockchain actually allows individual transactions to have their own proof of validity and the authorization to enforce those constraints. With information on a particular blockchain cut into blocks and spread throughout the world on individual servers, it ensures that if this information fell into unwanted hands (e.g., a cyber-criminal), only a small amount of data and not the entire network, would be compromised.

2.2. 5. User Controlled Networks

The investors and users are really encouraged by the control aspect of blockchain without the need of a regulatory central authority to overlook the transactions and trades. Rather than having a third party run the show, users and developers are the ones who get to control the network. The reliable peer-to-peer communications of blockchain can help create more effective transaction and trade ecosystems. Integrating it as a layer on top of the internet will make it easier to control and manage a large network of devices, without any centralized controller.

2.2.6. Secure

One of the greatest benefits of blockchain is the absence of any single point of failure. When transactions are approved they are encrypted using complex cryptography and linked to previous records. Every transaction is recorded and is shown to public. This information is stored across multiple computers, instead of a single server, which makes it difficult for hackers to steal or modify. Ensuring protection of sensitive data is crucial in sectors like finance.

3. APPLICATION OF BLOCKCHAIN IN STOCK EXCHANGE

Many years after the release of Satoshi Nakamoto's whitepaper called "Bitcoin: A Peer-to-Peer Electronic Cash System" triggering the invention of the blockchain technology, blockchain is still a very young technology with low levels of mainstream adoption and innovative solutions for everyday problems. Blockchain since then has been widely adopted in various fields like finance, railways, energy sector, etc. One of the useful of application of blockchain technology in finance[5] sector would be in stock market.

The most advantageous way blockchain technology can be utilized in stock trades is by accelerating the settlement of these trades. Securities traders, representatives, and brokers are required to experience a cumbersome, and costly, process which regularly takes three days or more to finish exchanges—for the most part because of the job of delegates, operational exchange freedom, and administrative procedures. Blockchain technology could make stock trades substantially more proficient through automation and decentralization. Blockchain technology can also help with fundraising and asset management, as well as margin financing, post-trade settlements, tracking securities lending, and monitoring systemic risk[6]. Ultimately, it can also help lessen expenses imposed on clients, and in some cases it could completely eliminate the need for a middleman. Major current pain points, particularly in cross-border payments and trade finance, can be solved by blockchain-based solutions, which reduce the number of necessary intermediaries and are geographically agnostic. This basically allows you to trade any stock belonging to any stock exchange or country as long as you are connected onto the blockchain.

Blockchain is gradually being accepted by leading security exchanges as a possible solution. NASDAQ has led the journey towards adoption of blockchain for stock trades. ASX (Australian Securities Exchange) is additionally moving in the direction of supplanting its present stage CHES (Clearing House Electronic Subregister System) with blockchain before the finish of 2020 or mid 2021 for clearing, settlement and other conceivable exchange administrations for Australian stocks. In attempt to cut expense, HKEX (Hong Kong Exchanges and Clearing) is looking to execute blockchain and now working with ASX to share their experience on blockchain usage up until this point. London Stock Exchange (LSE) is additionally moving in the direction of using blockchain in a critical manner. In July 2018, LSE has banded together with tech monster IBM which is considered as one of the worldwide pioneers in giving open-source blockchain solutions. These stock exchanges are aiming to provide a ease of use, transparent and reduced cost to encourage investors and traders to trade more actively. These stock exchanges also aim to encourage those investors and traders based in other countries who are geographically bound and barred to invest and trade stocks belonging to other countries and stock exchanges.

4. DIGITAL STOCKS – THE POSSIBLE FUTURE OF STOCKS?

Digital Stocks are tokenized versions of stocks. Essentially one token equals one stock. For example: 1 Tesla Stock = 1 Tesla Digital Stock. In many cases the Digital Stock owners are entitled to the dividends that are paid out to the stockholders. These Digital Stocks are also known as equities tokens in blockchain technology.

4.1. What are equity tokens?

Equity Tokens[7] function as a traditional stock asset. An equity token represents a share in the underlying company. As with any stock purchase, holders literally own their given percent of the total enterprise. They are entitled to a portion of the company's profits and a right to vote on its future. The only significant difference between an equity token and a traditional stock is the method of recording ownership. A traditional stock is logged into a database and can be accompanied by a paper certificate. An equity token records corporate ownership on a blockchain. The tokens are blockchain based and are issued on various blockchains such as Ethereum. Digital Stocks or Equity Tokens can be traded when stock exchanges are closed as the tokens themselves are not listed on stock exchanges such as the NYSE or NASDAQ. Rather the tokens are on a crypto or digital asset, the exchange which is generally open 24/7. Equity Tokens open new trading opportunities as it allows investors to access different markets globally that they may not have been able to. For example, a London based trader who does not

have access to U.S. company stocks such as Apple can now invest in the company via Digital Stocks.

4.2. What is tokenization of stocks?

Tokenization [8] is the process of converting rights to an asset such as stocks, bonds, etc into a digital token on a blockchain. There is great interest by financial intermediaries and technologists around the world in innovating how to move real-world assets onto blockchains to gain the advantages of Bitcoin while keeping the characteristics of the asset.

4.3. Why tokenize a real world stock?

Our world is full of assets: stocks, real estate, gold, carbon credits, oil, etc. Many of these assets are difficult to physically transfer or subdivide, so buyers and sellers instead trade paper that represents some or all of the asset. But paper and complex legal agreements are cumbersome, difficult to transfer and can be hard to track. One solution would be to switch to a digital system along the lines of Bitcoin but linked to an asset. Stock exchanges have largely done away with physical paper by substituting electronic transactions and standardized agreements, but the overhead of these systems is enormous and they generally rely on trusted participants and exchange boards to regulate the smooth functioning of a trade. Just like you can buy fraction of bitcoins, it is possible to buy fraction of digital stocks even though the real world stocks are bought in whole numbers [8].

4.4. An example of how digital stocks could solve traditional stocks problem

When an investor wants to buy or sell a stock, he can do so through a stock exchange broker. The stock exchange broker work on a commission basis which is basically a percentage of assets involved in the trade, whether you are selling or buying the stocks. A central hub or database is maintained about the ownership of stocks and they are updated after the trade takes place according to a long protocol, which needs to be followed. This may take a few days to be completed.

Imagine Bob sells a stock of tesla worth 1000\$ and he informs the stock exchange broker about his intention to sell it and also agrees to pay a brokerage commission of 3% which is 30\$. The broker then finds a buyer for the stock and informs him about the stock price and his charges as commission. The buyer agrees and pays 1000\$ to the seller and 30\$ as commission to the broker. The stock exchange broker makes 60\$ for just helping the buyer and seller perform a trade. There are some cases where millions of shares may be bought and sold and in such cases the brokers make thousands of dollars just as commission out of buyer and sellers net profit. This trade may also take a few days for the transfer of ownership of the stocks and e-certificate for the stock ownership.

Imagine the traditional stock was replaced with digital stock. The buyer and seller can perform peer-to-peer transaction between themselves without the need of stock exchange broker or bank or any other financial institution acting as intermediary. The brokerage fee charged is saved by the buyer and seller. The digital stock can be easily transferred through the blockchain without much time needed. Since the blocks store accurate and immutable trail, you can keep track of the ownership of digital stock permanently. Bob could directly send the digital stock across the blockchain to Alice without paying any fee for trade.

4.5. Future Growth

This speaks to the emerging token economy where equities will be tokenized via blockchain technology. A projected tokenized asset market of \$24trn of financial assets only in 2027 is predicted [9]. This includes tangible assets such as listed equities, unlisted equities, etc and

intangible assets such as patents, copyrights and trademarks. The first company to offer Digital Stocks is DX Exchange which is a NASDAQ powered EU regulated Crypto and Digital Stocks exchange.

5. CONCLUSION

Whether or not the stock market is broken, this paper provides an alternative form of trading that addresses several of the current problems with the traditional stock exchange. Using Bitcoin's underlying technology — the Blockchain — issuers will be able to create digital stocks that will allow anyone in the public to be able to buy, sell and see each transaction as it is taking place, which will remove some of the shroud of secrecy surrounding much of the high frequency and dark pool trading occurring today. This alternative market will also allow traders to trade completely peer-to-peer — cutting out several layers of intermediaries including stock exchanges, brokers and transfer agents. The key is that a digital stock market would not require the replacement of the traditional stock market; rather it would be an alternative market for users dissatisfied with the current regime. It is likely there will always be a need for both systems, just as with the advent of email there is still a need for the post office to manage traditional letters.

REFERENCES

- [1] Pop, C., Pop, C., Marcel, A., Vesa, A., Petrican, T., Cioara, T., Salomie I. Decentralizing the Stock Exchange using Blockchain An Ethereum-based implementation of the Bucharest Stock Exchange. IEEE 14th International Conference on Intelligent Computer Communication and Processing (ICCP), 2018.
- [2] Lee, L. New Kids on the Blockchain: How Bitcoin's Technology Could Reinvent the Stock Market. SSRN Electronic Journal, 2015.
- [3] Miraz, M. H., & Donald, D. C. Application of Blockchain in Booking and Registration Systems of Securities Exchanges. International Conference on Computing, Electronics & Communications Engineering (iCCECE), 2018.
- [4] Chatterjee, R., & Chatterjee, R. An Overview of the Emerging Technology: Blockchain. 3rd International Conference on Computational Intelligence and Networks, 2017.
- [5] Treleaven, P., Gendal Brown, R., & Yang, D. Blockchain Technology in Finance. IEEE Computer, 2017.
- [6] A.Sam Mire. Blockchain for Stock Markets: 11 Possible Use Cases, Retrieved from: <https://www.disruptordaily.com/blockchain-use-cases-stock-trading/>, 2018
- [7] Sam Reed. Equity Tokens vs. Security Tokens: What's the Difference? , Retrieved from: <https://www.bitcoinmarketjournal.com/equity-token/>, 2019
- [8] Addison Cameron-Huff. How Tokenization Is Putting Real-World Assets on Block chains. , Retrieved from: <https://www.nasdaq.com/article/how-tokenization-is-putting-real-world-assets-on-blockchains-cm767952>, 2017
- [9] Finoa. The Era of Tokenization—market outlook on a \$24trn business opportunity. , Retrieved from: <https://medium.com/finoa-banking/market-outlook-on-tokenized-assets-a-usd24trn-opportunity-9bac0c4dfefb>, 2018
- [10] Manisha Valera, Parth Patel and Shruti Chettiar, an Avant-Garde Approach of Blockchain in Big Data Analytics, International Journal of Computer Engineering and Technology, 9(6), 2018, pp. (115)-(120).
- [11] Deepika Sachdev, Enabling Data Democracy in Supply Chain using Blockchain and IoT, Journal of Management, 6(1), 2019, pp. 66–83
- [12] Irina Yakovenko, Lyazzat Kulumbetova, Irina Subbotina, Gaukhar Zhanibekova and Kenzhegul Bizhanova, the Blockchain Technology as a Catalyst for Digital Transformation of Education, International Journal of Mechanical Engineering and Technology, 10(01), 2019, pp.886–897