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Blockchain in Ecommerce

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Blockchain offers in 2021 a backbone for a new type of internet. As the use of blockchain technology becomes more and more captivating in online retail and much more, it is not surprising that more and more companies are investing in this technology and incorporating it and relying more and more on e-commerce. This article aims to structure the notions involved in blockchain technology and to highlight what the blockchain opportunity in e-commerce really looks like.

Keywords: e-commerce, blockchain, technology

1. Introduction

In recent years, during the pandemic, the term "digital transformation" has been in the attention of many companies, the organizational evolution being designed to move companies from the analog to the digital age. The changes ranged from creating a better in-store payment experience to a consumer-designed website. COVID-19 has had a global impact, affecting all markets and companies, but a special category that has faced huge difficulties is retail. With the closure of storefronts around the world, retail brands had to rotate quickly to survive the new market. For many retailers, the overwhelming percentage of sales still appear in the store - 84% compared to 16% online, according to the US.

Despite steady annual growth, online sales continued to play the second game in store sales. When the global pandemic hit, companies were forced to refocus their sales strategy as they switched to full e-commerce. There is no doubt that this global pandemic has changed the relationship of the retail ecosystem between offline and online sales and will continue to do so even after the reopening of brick shops. Firms that are able to build digital experiences and an online community will certainly gain the share of consumer spending in the retail space today and tomorrow.

Blockchains are naturally suitable for e-commerce because they are designed to store transaction data. However, this data does not have to be financial, for security reasons, but can be any separate action that requires an immutable record, including actions related to payment and order fulfillment.

The blockchain is a chain of blocks which contain specific information (database), but in a secure and genuine way that is grouped together in a network (peer-to-peer). In other words, blockchain is a combination of computers linked to each other instead of a central server, meaning that the whole network is decentralized. To make it even simpler, the blockchain concept can be compared to working on the same Google Doc simultaneously.

Blockchain could be thought as a digital ledger in which transactions made in bitcoin or another cryptocurrency are recorded chronologically and publicly. A digital ledger is an immutable public record of a digital transaction.

Block chain is to be thought as one such digital ledger. Blockchain is a simply a data structure where each block is linked to another block in time-stamped chronological order. It is a decentralized technology to maintain the records of cryptocurrency transactions.
Key point of blockchain

- Every new record is validated across the distributed network before it is stored in a block
- All information one stored on the ledger is verifiable and auditable but not editable
- Each block is identified by its cryptographic signature
- The first block of the blockchain is known as the genesis block
- Access data of first created block, we have to traverse from last created block to the first block.

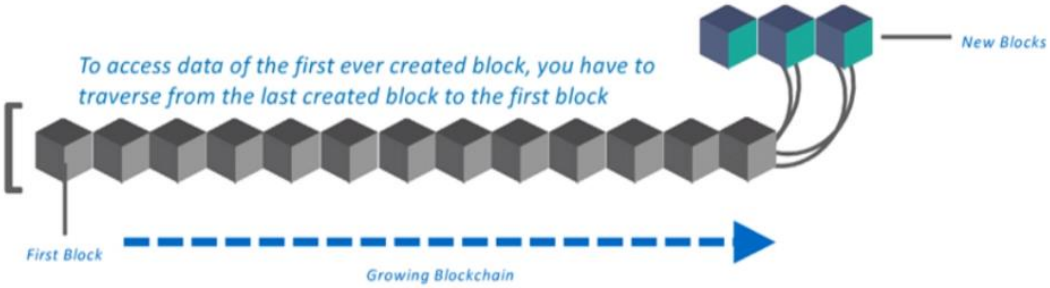

Fig 1. – Growing blockchain

As the name suggests and can be seen in Figure 1, the data is stored in a series of blocks that go in a straight line and follow each other. Here we start with the analogy of transferring money from one account to another. The blockchain has many use cases, the money transfer system is one of them.
When a transaction is made from account X to account Y., there must be a place to write all this information about the transaction. This place can be a history of data over a period of time, if we collect this information in one place, we can create a "digital block".

The following information becomes vital:

- Who transfers money and to whom is it transferred?
- What amount is involved in this transaction?
- What is the exact time of this transaction?
- Other information, such as the sender's signature or message.

In conclusion, a block is a place where information is collected, if we encrypt the collected data with complex encryption and add them together, they give us a clear and concrete result. We call the result block hash and this is a very important concept.
Each existing block (except the first, so-called genesis block) contains information about which block to follow. If we try to change, however, the parameters of the historical blocks, we will change their result and thus the information followed by the next block and thus its result, etc., until we reach the end of the chain. Combined with asymmetric cryptography, blockchain allows operations to be anonymous and prevent unauthorized transactions.

Databases are usually responsible for data management and they know what happens to the data. But there are many such places in the blockchain and they are all interconnected and all these nodes write the same "account book". Therefore, the blockchain

is decentralized, in other words, it is distributed as a book in itself, which is shared with all those who use the same network. Everyone receives a copy of the entire book and receives an update if there is a consensus among all nodes that the final state for the vast majority of books is correct. If someone on the network chooses to cheat, it would be easily detected and its actions on the network would have no effect. For example, Bitcoin as the oldest existing blockchain is decentralized and public.

2. Components of blockchain

Blockchain is like a book, and each page in the book is called a block, the stamp that verifies it is called a hash and everyone holding a copy of it is called a peer. But this ledger is special because we can't tear out pages or change what has been written and will only hold valid information that matches the same ledger on the majority of computers.

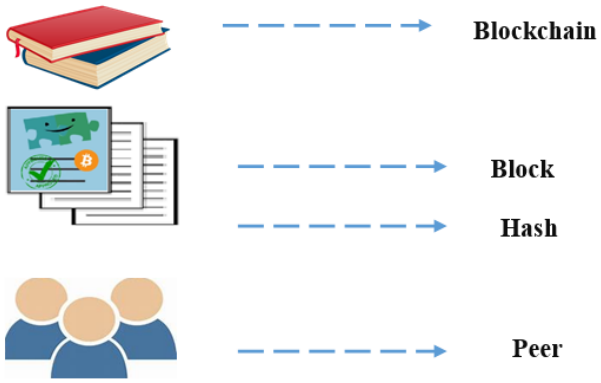

Fig 2. – Core blockchain architecture components

These are the core blockchain architecture components:

- **Block** — a data structure used for keeping a set of transactions which is distributed to all nodes in the network
- **Hash** - **–** Cryptography is a key component when it comes to blockchain. A cryptography has function is a function which takes an input (like message) and returns a fixed-size alphanumeric string. Actually a hash function is a mathematical algorithm who maps data of arbitrary size to a string of fixed size and in designed to be one way function. The main algorithms to create hash values are SHA and DSA. If we take the example of **blockchain** use in cryptocurrencies, transactions of varying lengths are run through a given **hashing** algorithm, and all give an output that is of a fixed length.
- **Transaction** — smallest building block of a blockchain system
- **Chain** — a sequence of blocks in a specific order**.**
- **Peer or Node** — user or computer within the blockchain. A blockchain network is comprised primarily of a set of peer nodes (or, simply, peers). Peers are a fundamental element of the network because they host ledgers.
- **Miners** — specific nodes which perform the block verification process
- **Consensus**— a set of rules and arrangements to carry out blockchain operations. Every transaction made using Blockchain is verified and extremely secure, the reason for its security being the use of a consensus algorithm. By definition, a consensus algorithm is a process in computer science used to reach an agreement on some

information between distributed systems. This concept was given in the use of blockchain technology. The consensus algorithm was designed for blockchain technology to ensure that each block of network input is fully validated and secure. There are many types of consensus algorithms.

By storing data in a peer-to-peer network, the blockchain architecture eliminates a number of risks that come when data is organized centrally. Peer-to-peer architectures such as blockchains do not have central points of vulnerability that hackers could exploit; they also have no central critical point - that is, there is no "important" computer whose failure would cause a network outage. Blockchain security methods include the use of public key cryptography. A "public key" is a long string of random characters and represents a blockchain address that records the value of tokens sent over the network to that address. Data stored on the blockchain are generally considered incorruptible. While centralized databases are much easier to control, modifying and manipulating data is possible and easy to do. By decentralizing data from an "accounting book", public blockchains provide transparency for all involved.

Each node (computer) in a decentralized system has a copy of the blockchain. The quality of the data is maintained by their massive replication and the need to solve mathematical puzzles (proof-of-work) to validate transactions. There is no centralized "official" copy and no user is "more reliable" than another. Transactions are published on the network using specialized software. Messages are delivered depending on how fast the nodes can communicate with each other. Mining nodes validate transactions add them to a block, and then publish that block when it is completed to other nodes. Blockchains use various consensus schemes such as proof-of-work or proof of stake. Increasing the size of the blockchain is accompanied by the risk of centralization, as only a few computers and users will have the resources to process large amounts of data.

3. How the blockchain works

In order to explain how blockchain technology works, we will start with a simple example involving Mr. X who wants to send a sum of money to Mr. Y. Mr X wants to send Bitcoins currency to MR. Y. This means Mr. X wants to make a change to the chain. He can make that change only by creating a new block. This block once created gets broadcasted to every computer on the disputed network (Bitcoin), or every connected device in this network is also up as a nod. The nods have to approve the change initiated. The miners on this nods are the ones who are going to approve this. They would approve only if the transaction is valid mathematical proof is required for this. Once approved the new block gets added to the chain and stays as a permanent record forever. Then the money moves from Mr. X to Mr. Y. If you wishes to access data of any block you have to traverse from the last created block to the required block.

1. Mr. X wants to send Bitcoins currency to Mr. Y.
2. The transaction is represented online as a block
3. The block is broadcast to every mining node in the network
4. Miners in the network approve the transaction if it is valid from mathematically perspective
5. The block can then be added to the chain, which provides an indelible and transparent record of transactions
6. The money moves from Mr. X to Mr. Y

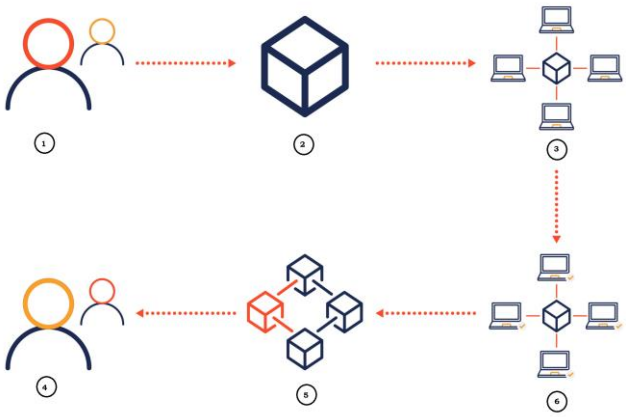

Fig 3. – How Blockchain works

4. Blockchain in e-commerce

E-commerce and the blockchain have the potential to become a powerful combination, as technology can bring security and transparency to many critical points. In the case of an e-commerce platform such as Amazon or Unilever, they must send the information to different companies. Blockchain could make this operation safer and more transparent, as responsibility spreads across the network. The same will happen with external transactions, increasing the level of trust between all parties involved.

Blockchain offers in 2021 a backbone for a new type of internet and a new way of doing business. As the use of blockchain technology becomes more and more captivating in online retail and much more, it is not at all surprising that more and more companies are investing in this technology and incorporating it and relying more and more on technology in e-commerce

Interest in the blockchain has spread like wildfire in the technology world in recent years, with large companies investing heavily in research into how they can adopt technology from their ecosystem to pave the way for Web 4.0.

The benefits of using blockchain technology could change the business market for the following reasons:

- **Much cheaper transactions** - The cost of transactions in a blockchain is lower than that of traditional e-commerce as public blockchains charge a fee of about $ 0.01 per transaction, and many private blockchains offer even higher fees. small, and through these costs the blockchain becomes the natural choice for digital transactions. The low costs incurred in blockchain transactions later opened the door to fast micropayments. By almost eradicating payment processing fees imposed by card companies and banks, online retailers could then transfer their savings to customers through lower product costs.

- Fast transactions - Compared to traditional payment systems, blockchains allow for much faster transactions. Blockchain transactions are carried out in a single network without the need for intermediaries, therefore, the speed of transactions is limited only by the capacity of the network. For example, Bitcoin can handle up to seven transactions per second, while other platforms, such as the Ethereum "Lightning Network", can handle up to one million transactions per second.

- New payment methods - Retailers will seriously consider using digital currency as a means of payment in the near future as many cryptocurrencies offer solutions to problems caused by traditional currencies. By using cryptocurrencies as a payment method, payment

gateways are becoming a thing of the past, as the risk of fraud is much reduced due to the aforementioned immutability of blockchains. Moreover, peer-to-peer cryptocurrencies are instantaneous, because the "middle man" is cut out of the image, saving a large amount of time and processing money.

- Data security - By distributing data in a network of many computers, it makes this technology not only reliable but also immutable. Instead of storing data on a server, blockchains are decentralized. This assures companies that a foreigner could not hack his data and take unauthorized action. Because decentralized data is encrypted and cross-checked by many nodes in the network, network infiltration would be extremely difficult and costly, as each node in the network would fight against any attack on the blockchain. Therefore, bypassing this defense would be possible only by simultaneously infiltrating most of the nodes located on the entire planet, otherwise known as the "51% attack". With data spread evenly across millions of nodes, companies are better protected from data loss due to server failures and disasters.

- Purchasing History - Storing historical sales data can often be a difficult task for some companies that typically make massive sales through their e-commerce systems. Using a blockchain to store details of all historical purchases means that proof of ownership is both immutable and impossible to lose, and this logic is also used to enforce warranties for products sold. With an impenetrable form of transactional data, companies can easily realize how authentic proof of ownership is when it comes to validating guarantees.

- Supply chain tracking - The unchanging and transparent nature of blockchain technology can eradicate the problem of retailers using immoral tactics to reduce costs at all stages of the supply chain or companies that cheap labor, poor quality parts and genetically modified foods transmitted as "organic". , holding each stage of the supply chain accountable for its origin. Because data cannot be changed, retailers and, more importantly, customers, will eventually gain confidence knowing that the source of each product can be tracked transparently throughout its life cycle in an authentic manner.

- Transparent market: This is one of the huge problems facing current e-commerce platforms. In order to solve the various problems that have arisen in the current e-commerce platforms, such as those related to transparency, e-commerce companies can use blockchain technology and will solve the problems as quickly as possible. Blockchain technology can use artificial intelligence to create a personalized user experience. Artificial intelligence is already helping e-commerce platform customers interact with the system in a better and more automated way. With this, the reviews and incentive programs would be impeccable.

5. Conclusion

There are almost endless possibilities for what blockchain could do for e-commerce. But the immediate future of the blockchain application here is still in development. Retailers are already considering automating administrative processes to save costs and take advantage of greater efficiency. You should consider the blockchain when weighing the benefits of automation. Security is probably the biggest asset of the blockchain. While hackers continue to make a short conventional security operation, e-commerce leaders should consider decentralized security powered by blockchain technology.

Blockchain technology and e-commerce respond to an interesting business opportunity in terms of transparency, reliability and cost reduction. However, it also poses several threats to companies that cannot add any value to their customers. With the exclusive benefits of the blockchain in e-commerce, it is now essential for the company to keep it for its

overall growth. Blockchain technology is proving to be a good solution for those providers who want to include transparency in their business transactions and manage consumer data reliably. It also helps reduce dependence on old paper systems and contains crypto transactions. So, if the business wants to remain meaningful to future customers, then it should start exploring the potential benefits of blockchain technology and e-commerce just now.

References

1. Jinan Fiaidhi, Sabah Mohammed, and Sami Mohammed. 2018. EDI with blockchain as an enabler for extreme automation. IEEE IT Prof. 20, 4 (2018), 66--72
2. Blockchain Architecture Basics: Components, Structure, Benefits & Creation
3. https://mlsdev.medium.com/blockchain-architecture-basics-components-structure-benefits-creation-beace17c8e77
4. Blockchain in eCommerce: A Special Issue of the ACM Transactions on Internet of ThingsBlockchain in eCommerce: A Special Issue of the ACM Transactions on Internet of Things
5. https://dl.acm.org/doi/fullHtml/10.1145/3445788
6. Blockchain as E-Commerce Platform in Indonesia https://iopscience.iop.org/article/10.1088/1742-6596/1179/1/012114/pdf
7. https://www.blockchain-council.org/blockchain/blockchain-role-of-p2p-network/
8. https://hyperledger-fabric.readthedocs.io/en/release-2.2/peers/peers.html
9. https://www.practicalecommerce.com/3-immediate-blockchain-uses-for-ecommerce-companies
10. https://www.eteam.io/blog/blockchain-and-ecommerce
11. https://customerthink.com/the-opportunity-for-blockchain-based-e-commerce-platform/