

BlockChain (BC), Technology Notary in Data Driven Marketing (DDM) Contracts

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Abstract

Today, Data Driven Marketing is challenged by the supply of vague data, inconsistencies between them and fraud through advertising in the digital marketing ecosystem. Through three basic concepts like open ledger, distributed ledger, and miners, BlockChain (BC) is a perfectly positioned technology, restoring not only trust and transparency, but ensuring a greater uniformity of transactions within a largely fragmented sector. BC makes DDM more directly and reliable, validating and analyzing each customer's movement in advertising campaigns. In BlockChain the traditional principle that creates the positive correlation between fee and delivery time through the "Third Trust Party" becomes null because transparency is one of the basic properties of this technology, which on the other hand for DDM is the Achilles heel.

Key words: chain, ledger, nodes, Merkle, Hash.

J.E.L. classification: A10, A19, C68, L15, M15, M30, M31, M37, L86.

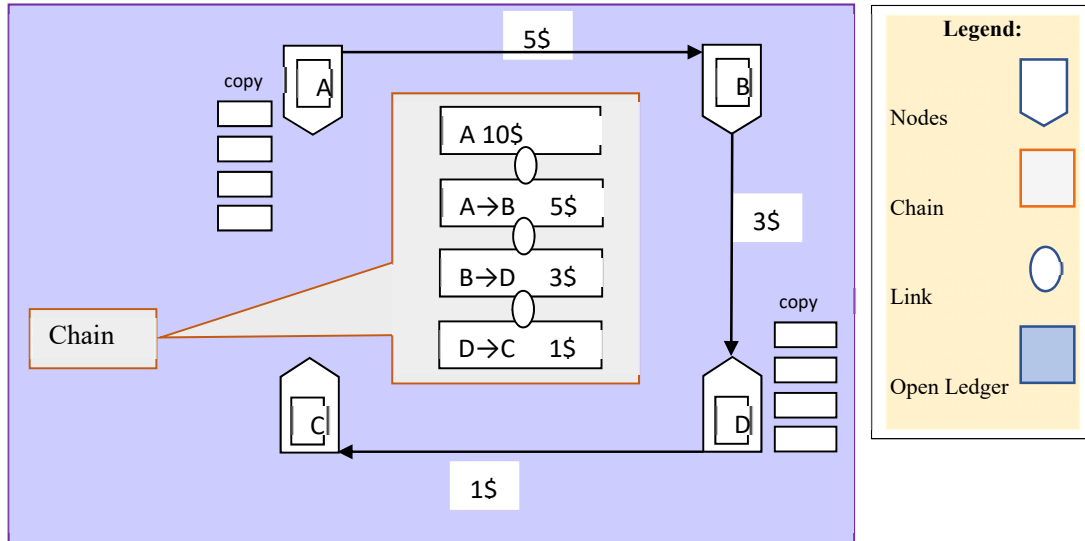
1. Introduction

It has been more than 12 years since Satoshi Nakamoto, the unknown person or group behind Bitcoin, described how the BC technology, a distributed peer-to-peer linked structure, could be used to solve the problem of maintaining the order of transactions and to avoid double-spending problems. Bitcoin orders transactions and groups them in a constrained size structure named blocks sharing the same timestamp.

The nodes of the network (miners) are responsible for linking the blocks to each other in chronological order, with each block containing the hash of the previous block to create a BC (Crosbyetal., 2016). BlockChain this innovative technology, is a system based on the digital currency transaction. This technology has received a lot of attention recently due to the success of the most popular cryptocurrency, Bitcoin. Attention! BlockChain is not Bitcoin. BC serves as an account book and immutable which allows transactions to take place in a decentralized manner. Applications based on BC are being set up, covering many areas of the economy including financial services.

The reputation of the Internet of Things (IoT) system, lately completing data driven marketing. BlockChain is effective as a registry (open book / legend) distribution technology, or DLT. A distributed ledger is openly shared with all participants, and there are no private transactions, and it is decentralized. Cryptographic verification from block to block creates a chain of trust in these transactions. There are still many challenges to BC technology such as scaling and security issues which are still improving and thus the "gaps" displayed, to be overcome through three substantial concepts on which BC technology is based. Suppose we have a network of four people which are labeled "nodes" eg: A (in Switzerland), B (in Albania), C (in Greece), and D (in Italy), who transfer money between them. We continue the assumption by stating that initially in "Genesis", A has \$ 10 and from these he transfers to person B the value of \$ 5. Under these conditions a transaction is performed where we link the genesis with the transfer from A to B. Then, B transfers to D \$ 3. And so, from D to C are transferred \$ 1.

Figure no. 1. A Open Ledger



Source: Authors' idea

Open Ledger

The three basic concepts on which Blockchain technology is built.

i. Open Ledger, is the open and centralized registry only to the nodes that are part of this, and in this way is created a Chain with transfers (transactions), within an open register. Ledger is basically a chain of transactions that is open and public to anyone. That is one of the reasons why it is called BC. But what we mean by this open and public register? It is open and public, it means that any of the 4-people in the network can see where \$ is, how much \$ everyone has in their pocket and any of the people in the network can decide if a transaction is valid or not. If we want to transfer \$ 15, this is impossible because Genesis started at \$ 10 and none of the nodes in the network (ABCD) has \$ 15, so this transaction will not be active in this open legend. Such a transaction is not possible and thus cannot be part of the chain. Because we have a centralized location this means that Ledger does not have the option to provide \$ 15 to complete the required transaction. But the primary goal of BC is to alienate centralization.

ii. Distributed Ledger, is a distributed and decentralized register, and implies that BC is changing form, from open and centralized to distributed and decentralized, beyond nodes in the network. If we continue the assumption, illustrated as in Figure 1, node D may be creating a copy of the open legend of all transactions and meanwhile and A can do the same. When this copy becomes available for anyone to copy (not just those in Figure 1) to make the same for those who participate in this network, and give to someone who is not in this centralized group the opportunity to copy the same, from other countries like Kosovo, Romania, Zealand, etc.

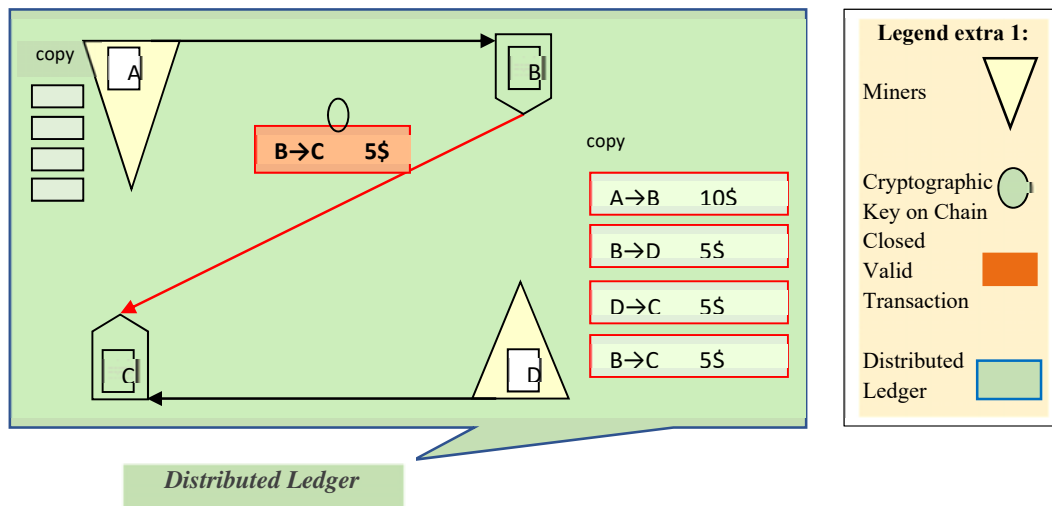
Then we entered a partially decentralized legend as in figure2. Since we are dealing with different copies of this legend, BC ensures that all these copies are synchronized (coordinated) between them, and all participants who want to access in this network can see the same copy of the registry Ledger and have the same version of it.

- To evaluate the new transaction, that it is a fact because B wants to transfer to C \$ 5.
- Create an algorithm and find a special key which activates the mine to take over this transaction, and that after this to be able close the whole.

To achieve this process, the mine calculates its own powers to know if it has the financial potential and time to complete this transaction because this key is completely unpredictable. Through its algorithm, the mine generates keys to solve this random puzzle. Firstly, she must find the funding. In terms that it has financial capacity, it remains to be seen how ledgers are synchronized on the network. Meanwhile from the assumption, mine D undertook to carry out the transaction between B to C and record it. Later, she finds a way to network (publish) this transaction and to express that it

is a valid transaction. To have a dispersed (not open) state the legend must be decentralized. Figure 1, transformed into the new outline Figure2. After D transmits and has completed the chain of this transaction, then the key that performed it () closes it as a transaction.

Figure no.2. Distributed Ledger



Source: Authors' idea

In short, BC is a dynamic form of book distribution technology based on the BlockChain concept, where each block represents a digital record of a bunch of valuable digital transactions. The structure and technology of BC is open, distributed and decentralized and so is its organization and development. Distributed Ledger (Register / Book / Legend), on the other hand, refers to all those technologies that aim to facilitate connection to a shared database, designed to provide an assessment of transactions and a consensus record. The technology behind the distributed ledger is a common Internet game because the process is totally decentralized and transparent.

iii. Miners, is also the basic and the most important principle of BC, illustrated below with Fig2. So, we had an open legend. It was seen from all nodes part of the centralized network, but with mining, it is understood that we now have a distributed legend of various nodes and decentralized. What remains to be understood is how these nodes are synchronized between them as best as possible.

To give a sense of this situation we are still assuming that B (in BC fig.2, where the legend is decentralized, we mentioned that it does not matter where the node (person) is located and this was one of the three practical advantages), will transfer to C a value of \$ 5. Meanwhile nodes B transmits (publishes) and describes the transaction that has made it. Immediately anyone on the network sees and understands that B, wants to transfer \$ 5 to C. This fact has not been yet billed (on paper). To be documented we must wait to clarify the new concept of Miners. These mines are special nodes, they are waiting for a ledger (recording), to be closer to the explanatory mode, and to not add other nodes to complicate it, assume that A and D, are mines. The mines, now when the transaction are occurs between B and C, decide who will be the first to accept this transaction and who will validate it. Now one of the mines wins the "race" and finds a way to finance with digital currency. But how, one of these Mines win the transaction? To answer, in advance these two nodes make two more assumptions:

1. To evaluate the new transaction, that it is a fact because B wants to transfer to C \$ 5.
2. Create an algorithm and find a special key which activates the mine to take over this transaction, and that after this to be able close the whole. To achieve this process, the mine calculates its own powers to know if it has the financial potential and time to complete this transaction because this key is completely unpredictable.

Through its algorithm, the mine generates keys to solve this random puzzle. Firstly, she must find the funding. In terms that it has financial capacity, it remains to be seen how ledgers are synchronized on the network. Meanwhile from the assumption, mine D undertook to carry out the transaction between B to C and record it. Later, she finds a way to network (publish) this transaction and to express that it is a valid transaction.

To have a dispersed (not open) state the legend must be decentralized. Figure 1, transformed into the new outline Figure2. After D transmits and has completed the chain of this transaction, then the key that performed it () closes it as a transaction. In short, BC is a dynamic form of book distribution technology based on the blockchain concept, where each block represents a digital record of a bunch of valuable digital transactions. The structure and technology of BC is open, distributed and decentralized and so is its organization and development. Distributed Ledger (register / book / legend), on the other hand, refers to all those technologies that aim to facilitate connection to a shared database, designed to provide an assessment of transactions and a consensus record. The technology behind the distributed ledger is a common Internet game because the process is totally decentralized and transparent.

There are different types of blockages in the ecosystem which will be addressed in the following sub-topics. There are three types of BC: 1. Public; 2. Private; 3. Partnership / Consortium.

Five basic principles underlying technology.

1. Distributed database.
2. Peer-to-Peer transmission.
3. Transparency under a pseudonym (Anonymous).
4. Irrevocability of Recordings.
5. Computational logic.

2. Literature review

Modern technologies put consumers at the forefront of security, privacy, trust, and transparency challenges. BlockChain is transforming digital marketing by removing companies’ abilities to pull data from customers without also offering to reimburse them for its value. Marketers can leverage the technology’s positive attributes that customers are searching for in today’s digital landscape, both in transparency and data protection. In terms of digital marketing, BC is one of the most important topics for its applications in the marketing field. Argues that each time individuals engage in an online transaction (Prabhaker, 2000). They leave behind a digital trail of detailed information about their identity, their buying preferences, spending habits, credit card details, and other personally identifiable information (PII) (i.e., data that can be used to identify a particular person). Online businesses regularly fail to meet regulatory requirements, and privacy leaks are frequent and have a lasting impact on consumers' trust (Ingram et al, 2018); (Martin, 2018); (Bodoni, 2019).

As a result, consumer awareness heightens, their suspicions raise, and they are more prudent about online transactions as their (PII) can be used or sold for monetary gain without their permission (Norman et al, 2016). Avoiding online purchases is not a solution since brick-and-mortar retailers also encourage the use of loyalty cards and maintain a centralized database which may be vulnerable to hacking or misuse. Moreover, many developing countries do not have privacy regulations in place to protect consumers (PII). Therefore, brands must keep abreast of the latest privacy regulations, understand consumer expectations, and keep up to date with technology innovation and best practices. Advocates for enhanced consumer privacy suggest that systems should be built with a “privacy-by-design” framework (Cavoukian, 2011). The recent hype around BC technology has led to promising use cases in areas such as finance, supply chain management, healthcare, tourism, real estate, and the marketing field is no exception. Initially launched for underpinning the cryptocurrency BC. Technology and Applications for Digital Marketing provides insights on BC technology and its applications in digital marketing. This paper provides an orientation of how this technology is functioning within modern marketing and how it can influence the future of the digital marketing industry. The applications of BC, benefits and challenges, disruptive innovations in digital marketing, privacy and security concerns, and the recent trends of BC in digital marketing. The inherent characteristics of BC architecture and design provide properties like transparency, robustness, auditability, and security (Greenspan, 2015); (Christidis et al, 2016). A BlockChain can

be considered a distributed database that is organised as a list of ordered blocks, where the committed blocks are immutable.

What BlockChain Could Mean for Marketing (Ghose, 2018)? BlockChain can make data-driven marketing more transparent by validating and analyzing every consumer's journey through verified ad delivery, confirming that a real person saw the ad as per the specifics of a media contract. Marketers will be able to control how their assets are delivered by monitoring exactly where their ads are being placed, alleviating ad fraud from automated bots by ensuring that real followers and consumers are engaging with their ads, and ensuring proper ad engagement tracking that will lead to more precise digital attribution. How consensus is reached in BC, between the nodes? This consensus is known as the Byzantine Generals' Problem (BG). The Byzantine fault tolerance concept originates in the BG problem. The gist of the story: the Byzantine army has surrounded an enemy city. The army is led by several Byzantine generals and each of the generals leads their own division. However, there are traitors among the generals who are interested in the Byzantine army failing. The BG problem is a term etched from the IT science description of a situation where involved parties must agree on a single strategy to avoid complete failure, but where some of the involved parties are corrupt and disseminating false information or are otherwise unreliable. (Zheng et al, 2017).

Marketing helps companies to understand and explain the value a consumer perceives and derives from a product or service (Larivière et al, 2013). Despite uncertain financial returns, small firms are now investing in fee-based technologies and platforms that they perceive as essential for sustaining a competitive position in their markets (Rishel et al, 1997). Digital marketing is leveraging new channels across social media that provide firms with new, innovative, cost-effective, and influential capabilities to engage with customers (Melewar et al, 2017). In turn, customers are becoming an integral part of the evolving engagement dialogue and are strengthening their influence on the marketing process (Berman and McClellan, 2002).

3. Research methodology

The internet-enabled technologies help the businesspeople to develop new digital markets and to make new demands for their products and services. Thus, the internet-enabled technologies are contributing a lot to the market engagement and customer target. In line, a new technology called blockchain has transformed the digital marketing process completely and helps to do the business effectively with accurate and up-to-date data. Like the marketing automation technologies redesign the firms' outreach one side and increase the consumers' purchase intention on the other side, thus the new generation marketing technologies shifting the customer-company relations to the new horizons (Treiblmaie, 2018).

Blockchain technology works by creating an environment that is secure and transparent for the financial transactions of virtual values. Hash codes of each block keep records safe in the blockchain. This is mainly because irrespective of the size of the information or document, the mathematical hash function provides a hash code of the same length for each block. So, attempting to change a block of information would generate a completely new hash value (How Blockchain Technology Works, online 2019). A network that is open to everyone and concurrently maintains user's anonymity undoubtedly raises trust issues regarding the participants. So, to build the trust the participants need to go through several consensus algorithms such as Proof of Work and Proof of Stake. The digital cryptocurrency Bitcoin uses the first-ever blockchain technology (Amaba et al, 2017).

It is a digital store of value that enables peer to peer transactions over the internet without the intervention of a third party. The blockchain network is a decentralized structure that consists of scattered nodes (computers) that inspect and validate the authenticity of any new transactions that attempt to take place. This combine agreement is done through several consensus models by the process of mining (Baliga 2017). The process of mining demonstrates that each node trying to add a new transaction has gone through and solved the complex computational puzzle through extensive work and deserves to get a reward in return for their service.

For the validation of a transaction, the network must confirm the following conditions: The sender account holds sufficient cryptocurrency balance that it intends to transfer (Prashanth Joshi, 2018). The amount intended to transfer has not already been sent to some other recipient. Once a transaction has been validated and agreed upon by all the nodes, it then gets added to the digital ledger and

protected using cryptography that uses a public key that is accessible to all the other nodes and a private key that must be kept secret (Wachal, 2019).

To maintain the transactions using digital currency in the blockchain network, we need to understand the digital wallet which is used to store, send, and receive digital currency (Li, X., Jiang 2017). A digital wallet or a cryptocurrency wallet is a string of letters and numbers forming a public address associated with each block in the blockchain. This public address is used whenever a transaction takes place; However, to prove the ownership of the public address there is a private key associated with the wallet that serves as the user's digital signature that is used to confirm the processing of any transaction. The user's public key is the shortened version of his private key generated through complex and advanced mathematical (Tschorsch et al, 2016).

BlockChain is not a cryptocurrency and should not be confused with cryptocurrencies such as Bitcoin. Nowadays, cryptocurrency has become an everyday word both in industry and in academic settings. When we use the word cryptocurrency the mind simultaneously goes to the most successful cryptocurrencies, such as Bitcoin, Ethereum, which have achieved great success with their capital in the world market. With a special data storage structure, transactions on the Bitcoin network can occur without the involvement of any third-party intermediary, because at the core of the technology to create this cryptocurrency, is the BlockChain (which was launched in 2008 and implemented for the first time in 2009). Blockchain has brought a drastic change to technology in the last few years, and it is referred to as distributed ledger technology (DLT). The BC can be considered as the main public book that records and stores in the block all transactions that take place. This chain grows as new blocks are added to it constantly. From time to time, the hash digest of the last mined block is written into a public blockchain to guarantee immutability. The right to send transactions is granted by validator nodes to users by endowing them with the local Ethers mined. Overall, the proposed approach has the same transparency and immutability of a public blockchain, without its drawbacks, (Marchesi et al, 2020).

Marketers can leverage the technology's positive attributes that customers are searching for in today's digital landscape, both in transparency and data protection. In terms of data drive marketing, blockchain is one of the most important topics for its applications in the marketing field. Blockchain Technology and Applications for Digital Marketing provides insights on blockchain technology and its applications in digital marketing (Ramachandran et al, 2017).

4. Findings

4.1. What exactly can BC Technology do for DDM?

Through this technology, many traders will be profitable and will not suffer the permanent problems created from: Data inconsistencies; The challenges of an unclear supply chain; Advertising fraud in today's digital marketing ecosystem.

BlockChain is a perfectly positioned system to address these issues, restoring not only trust and transparency, but ensuring greater uniformity of transactions, especially within a largely fragmented sector. This will potentially revolutionize the way that marketers conduct their campaigns. Intelligent contracts and self-executing agreements can be pre-coded with guidelines to evaluate impressions, ensuring that each meets a common standard.

From what we refer in this paper, the premises are created to: have high uniformity in data standards while offering greater assurance in terms that advertisers do not "pay" only for genuine impressions of the service but to create the ideal premises in relation with visibility and everything to be verifiable. This could potentially solve the permanent issue of the Achilles heel in DDM, which stems from advertising fraud, which is estimated to capture \$ 35 billion for a year. Simultaneously, as an immutable and distributed ledger BC can inject greater responsibility into a well-thought-out campaign environment designed by marketers. Through BC, all actors of the marketing campaign involved, gain a complete and standardized view of all transactions that occur in real time. In a Forrester report, for 2016, up to 56% of the entire on-screen advertising budget was lost in fraudulent inventory. The cost of advertising fraud worldwide is expected to rise to \$ 50 billion over the next decade (A. Weissbrot, 2020).

A recent study on the state of programmatic advertising found that 79% of advertisers surveyed expressed concerns about transparency, and by over a third about the lack of being exposed by third parties as one of their main concerns. Data-driven marketing accomplishes what was once almost impossible to achieve due to data quality issues. A smart contract in the BC can fix this by providing a level of tracking and transparency that is currently realized by DDM. If consumers share more of their preference information, marketers will know more about them, which in turn will increase the relevance of their messages and decrease their advertising frequency. Natural transparency based on the BC registry book can help companies gain consumer trust.

From what we have encountered in today's theories through this modest paper, we can confirm with conviction that BC helps to achieve innovation, increase transparency, refine data standards, and advance an integrated approach to quality service in those enterprises and digital marketing-driven industries. It can promote digital advertising to consumers, it is profitable in spending big money on digital advertising campaigns. Under the new technology, consumers can share and improve their statistics simultaneously with advertisers and advertisers. BlockChain technology can be considered to restore data control to statistics researchers focused on digital advertising.

4.2. Introducing BlockChain in Data Drive Marketing

In fact, consensus is an incredible transformation. But how to reach a consensus in a diffuse and high-risk environment, is a challenge. Equally a challenge for BC is how the network is distributed. BlockChain technology, there is no central node that ensures that the main registers in the distributed nodes are all the same. Most of BC are currently used in financial markets. More and more apps are popping up. Traditional industries can consider BC and implement it to increase their campaigns. User reputation can be stored in BC, but at the same time the emerging industry can use BC to improve performance. BlockChain has shown its potential for transforming the traditional industry with the features of its main: decentralization, persistence, anonymity, and auditing. In this paper, a more descriptive overview of BC is presented.

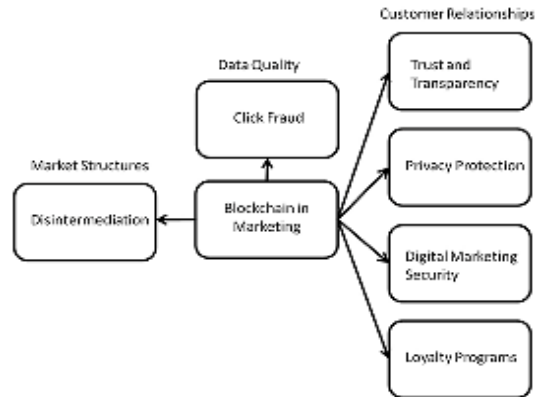
By analogy, data-driven marketing, in the policies it harmonizes, is on the concept of creating a simple profitable business. In the primary mission that DDM has, it is interested in creating an accomplished environment. To "catch in the air" the preferences of customers and create for them the highest level of satisfaction. In this aspect, DDM uses BC systems to secure this mission. After BC was classified as a technological experiment, it has since taken the big step from theory to practice, and while technology continues to mature, we are seeing increased development solutions that are ready for enterprise. Today society is totally digitalized, and technology is playing a very important role in the life of everyone (Ragothaman, 2021).

BlockChain is a method which is useful in recording information and makes it difficult to change, hack or cheat with the system. A BlockChain is essentially a digital transaction volume book that is distributed throughout the overall IT system network in the BC. This technology acts as a reliable layer in the evolution of e-commerce. The spread of information, communication technology and a host of smart internet business platforms came together with smart phone technology, which later created the internet of things, and thus changed the business landscape, restructuring their bodies and renew the value creation process. In this way it facilitates the strategies of marketers to achieve a deeper level and a wider customer base from the personalized goals of the customers, thus increasing the trust and loyalty of the customers towards a certain brand. Internet enabled technologies gave an unimaginable impetus to develop new digital markets and make new demands on the products and services offered by marketers. Thus, technologies enabled by the internet are greatly contributing to market engagement and customer targeting. Whereas a new technology called BC, has completely transformed the digital marketing process (data driven marketing) and helps to do business in an effectively way with accurate and up-to-date data.

Rigorous academic studies on blockchain applications in support of marketing activities are scarce. Despite this, in the practitioner-based literature, the benefits of blockchain are viewed as indisputable (Ghose, 2018). From a consumer-centric perspective, blockchain technology has the potential to substantially transform consumer relationships by enhancing data and information transparency and improving privacy and security. It also allows for innovative forms of consumer loyalty programs which might help to create additional value. Data driven marketing, has

demonstrated how BC technology as a data science innovation based on data operates in the customer-centric model. The use of BC technology in digital marketing is still a concept that has just emerged.

Figure no.3. Impact of blockchain on marketing.



Source: <https://www.frontiersin.org/>

The principal role of BC is to create secure digital registers and will also allow secure storage of data. Authors (Erragcha et al, 2021) in the book "Blockchain Technology and Applications for Digital Marketing" have given us an explanation of the meaning of the concept of BC technology, its principle of operation, as well as the different types and sectors of its applications, to make the relationship between BC technology and other emerging technologies, such as big data, AI and smart contracts, to review the positive impact of BC technology on the e-commerce sector and in particular on customer relationship management as a key challenge in DDM.

4.3. The challenge" of cryptocurrency in digital marketing

Over the last few years, Cryptocurrency has developed, both in value and in comprehensiveness. Indeed, many industry leaders believe that Cryptocurrency can change money and promote it until the end of time. In any case, as computerized money, (Bitcoin turns out to be the most common), Cryptocurrency can introduce some issues to advertisers hoping to collect buyer information. The cryptocurrency market is a convenient environment dependent on distributed network innovation.

Decentralization is a distinctive feature of this framework and is an impression of how there is no national central bank or other case that authorizes power over the entire organization. Exchanges are managed and controlled to use an acquired BC system that relies on customer assets called diggers / miners. Using blockchain technology in digital marketing is still a budding concept. Blockchain is a decentralized digital technology that is growing and standing out in digital marketing. The potential use of blockchain technology (BCT) will help affected companies create secure digital records and will also allow secure storage of data (Hence, 2021).

Today, the world has become a digital platform where technology has become an important part of daily life (Trivedi et al, 2021). The world is growing at a rapid pace where there is an innovation every day. As the days go, every aspect of life fade into the internet. Companies have also identified the field and opportunity of digital marketing. Cryptocurrency itself is a challenge for digital marketing. The purpose of the research is to identify the impact of cryptocurrency on digital marketing. Digital marketing is a Data driven Marketing technique and cryptocurrency is a payment method which hides the data, thus, the popularity of cryptocurrency as a payment method is a current challenge for digital marketing.

4.4. Development of a model achieved in BCh

Digitalization through technology influences to change a business model and provide new revenue models and inevitably opportunities for value production.

Blockchain is a type of database that stores different types of information in blocks that form an information chain. It is one of the secured ways of transferring and storing data. Blockchain is helping build trust for digitalization among its users. Numerous researches have concluded that the basic model in the production of value in DDM, through BCh technology, passes five variables: Residence; Privacy; Faith; Security; Purpose.

We are still a little far from the current implementation of BCh by the Ad-tech ecosystem. The main roadblock that needs to be improved is the speed of transactions. Due to its diffuse nature, where transactions are verified by "miners" around the world, a block usually takes 10-30 seconds to authenticate transactions. This means that Ad's technology transactions (which occur in milliseconds) cannot be estimated very quickly nowadays. In this way, DDM managers who implement advertising technology will have to group advertising transactions into a single block to create a single transaction, but on the other hand there is the risk that it reduces transparency. In the short term, brands are likely to use BC as a post-campaign layer to authenticate and validate transactions, not in real time, but after the fact occurs. However, this is still a major improvement over current practice. Despite the speed limitations, BC will change the data-driven marketing business landscape (Ghose, 2018).

Covid-19 has completely changed the way we live and has also changed the way we work. The current disruption from the Pandemic has created many challenges for all businesses in the short term but has created many opportunities in the long run (Bathla et al, 2021). By helping with crisis and recovery, BC can play an important role in accelerating post-crisis digital transformation initiativeson (2021) "BC technology and Applications for Digital Marketing". Trading has become more efficient, comprehensive, and less costly through BC (Schwab, 2016).

5. Conclusions

There is ample evidence of how consumers are willing to share their data with marketers in exchange for the best offers they regularly support. Their discovered preference is that they are willing to separate from the data to gain something of real value. This means that brands that have won the trust of the consumer and that offer a relevant exchange will be given greater access to personal information. In an asymmetric way we can say that cryptography and consensus distribution with algorithms have been implemented for user security and log book stability.

Blockchain technology usually has the key characteristics of decentralization, consistency, anonymity, and auditing. BlockChain with these features can save a lot of costs and significantly improve efficiency. As it allows payment to be completed without any bank or intermediary, BC can be used in various financial services such as digital assets, remittances, and online payments. Furthermore, it can also be applied to other areas, including smart contracts, public services, Internet of Things (IoT), reputation systems and security services. These areas favor the BC in many ways.

First, BC is immutable and basically the algorithms are resistant to data modification. The transaction is difficult to confuse, it is "tangled" in the BC. Businesses that seek to have high honesty and credibility, to attract customers can use the blockchain. This is where Data Driven Marketing comes in. But, in addition, BC dispersed and can avoid the weakness of even a single point in a failure situation. In terms of smart contracts, the contract can be executed by the miners automatically after they are linked to BC. Although BC technology has admirable potential in building future Internet systems, it is facing a high number of technical challenges. Escalation is the biggest concern. Example: The size of the Bitcoin Block is now limited to 1 MB, while one block is mined about every 10 minutes. Subsequently, the Bitcoin Network is limited to a rate of 10 transactions / second, which is impossible to accomplish with high trading frequency. However, wider blocks mean more storage space thus making network propagation slower. This will lead to gradual centralization as if we want to keep fewer users on such a large BC.

Therefore, the "tradeoff" between block size and security has been a difficult challenge. Blockchain makes data-driven marketing more transparent by verifying and analyzing each customer's journey through verified ad delivery, confirming that a real person saw the ad according to the specifics of a media contract. On one hand, entrepreneurs will be able to control the way their assets are delivered by monitoring exactly where are spent their budgets in their marketing campaigns, bypassing ad fraud by automated clicks ensuring that true followers and customers engage with their advertising and ensuring proper advertising engagement tracking that will lead to more digital attributes. On the other hand, the annoyance and embarrassment experienced by consumers will be minimized. Companies are overloading their customers with lots of ads, emails, coupons, and messages. The reason they send a dozen different messages is that they do not know too much about consumer preferences. The current practice is often like throwing a dozen darts into the air and hoping that someone will be hit. Blockchain technology can prevent the same ad on the monitor from being served on anyone, ensuring the optimal frequency of ad service for each customer. Studies have shown that when it comes to the impact of ad exposure frequency on consumers' propensity to buy, somewhere between four and six ad exposures is optimal. Although BC, reduces the risk of manipulation, fraud, and cybercrime due to its immutable nature. There is no need to trust to a third party now that the data is stored in distributed ledgers. There are several other advantages specific to the case in which it is used.

The pandemic changed the way of all businesses run in relation to the past. Many of the businesses today either close due to lack of technological performance or others move towards online mode to maintain their position in the market. During this pandemic, businesses have no choice but to switch to online mode. Some of the businesses have surrendered as it was not possible for them to switch to online mode in such a fast and short time due to lack of technology and lack of knowledge. They faced many difficulties to operate in their markets and were forced into bankruptcy. The impact of technology during Covid-19 pandemic plays a very important role worldwide. When this pandemic was at its peak technology became like a lifeline to human beings. Blockchain is a unique new technology, and the way facts are stored and shared electronically. Blockchain in digital advertising reflects clarity, security and access to revenue and overflow.

In conclusion, Blockchain is a technology. In my opinion if it is not opposed, BC technology can be imagined like a financial institution that realizes, secures, and guarantees cryptocurrency transactions. Regarding to the role of this technology in economy and marketing, it creates a new dimension. We can say that the security provided by BC Technology is like the function of a notary in Data Driven Marketing (DDM) Contracts.

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