IJEBE INTERNATIONAL JOURNAL OF ECONOMICS, BUSINESS AND ENTREPRENEURSHIP

Vol. 5, No. 1,2022

Blockchain Technology in Digital Marketing: Roles and Challenges

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ABSTRACT

Implementation of Blockchain Technology (BCT) has an important effect on digital marketing to increase the company sales, and develop the customers' trust, but the implementation of Blockchain technology in dealing with Digital Marketing is still limited. Therefore, the purpose of this article is to examine how significant the role of BCT implementation in Digital marketing is and how its challenges are faced. The results show that not all companies have implemented Blockchain Technology for marketing activity, especially in dealing with Digital Marketing Implementation. The handicaps that companies did not implement Blockchain Technology are in terms of low technology literacy of human capital and technology infrastructure availability due to the limited investment capital. So, these are the challenges for the company especially in SMEs to have human capital with high technology literacy and skills or talents, and require a full system of digital technology infrastructure supported by the government role.

Keywords: Blockchain Technology, Digital Marketing,

INTRODUCTION

The widely used prevalent types for digital marketing initiatives are Clicks and Display ads as digital advertising activity (https://www.reportlinker.com/p03646022/?utm_source=GNW), so one of digital marketing activity due to the digital technology development, and reliant on digital platforms and technologies is doing digital advertising activity to attract many potential customers, improve the company sales and market shares, and develop sustainable business performance, by using mainly internet media (Desai, 2019); (Bala and Verma, 2018); (Chaffey and Smith, 2017)

Furthermore, the companies believe that digital marketing use is the best solution to overcome various marketing problems especially for getting customers' engagement and loyalty (Brauer et al., 2020). However, many companies are still finding it difficult to maintain loyal customers because digital marketing is not implemented optimally. To implement digital marketing activity, the company needs the technology tool, called Blockchain Technology (BCT). Blockchain technology can manage the customers used by the company to have interaction with customers and build better relationship with the customers (Harvey et al., 2018), supported

by big data availability, so consequently the strong bonding relationship can be achieved to have the long-life customers loyalty (Rabby et al., 2022). This statement is relevant to the research finding by Wiratama and Pasaribu (2021); Brauer et al. (2020); Ertemel (2018), that Blockchain has a big beneficial impact on digital marketing by eradicating dishonest practices including deep fakes, fraudulent reviews, and click-fraud, and will have strong relationship (Brauer et al., 2020) so that the loyal customers still engage to the company product and brand. On the contrary, the company also faces the challenges in using blockchain, as stated by Brauer et al. (2020). However, Blockchain Technology adoption for Digital Marketing is limited, as Rahman (2021) said. Also, Casino et al. (2019) stated that Limited attention was devoted to state-of-the-art blockchain applications, as Zheng et al. (2018), claiming that implications for blockchains are not yet fully applicable and full extent to multiple domains. The study of Blockchain role just focuses on creating decentralized and data-intensive IoT applications. (Christidis and Devetsikiotis, 2016), managing big data through a decentralized approach (Karafiloski and Mishev, 2017), blockchain safety issues (Khan and Salah, 2018)(X. Li et al., 2020) (Meng et al., 2018), facilitate decentralization and trust in service systems (Seebacher and Schüritz, 2017), P2P platforms (Hawlitschek et al., 2018)., its consensus procedure (Sankar et al., 2017), the shortcomings of SCs (Atzei et al., 2017), its usability, data integrity, scalability, and bandwidth (Yli-Huumo et al., 2016); (Koteska et al., 2017), and the financial side of blockchains and the security and privacy it offer (Bonneau et al., 2015);(Tsukerman, 2016);(Mukhopadhyay et al., 2016);(Kus Khalilov and Levi, 2018);(Conti et al., 2018). Therefore, this research purpose is to explore BCT roles and challenges especially in digital marketing implementation, by using descriptive research design with literature review analysis.

LITERATURE REVIEW

Definition and Application of Blockchain Technology

In general terms, Blockchain technology (BCT) is a sophisticated database method for the transparent exchange of business network information. Consequently, Blockchain technology utilizes the database system to store data in interconnected blocks. The data cannot be reliably erased or modified without network consensus. Business networks can utilize blockchain technology to establish an irreversible ledger for monitoring orders, payments, accounts, and other activities. (https://aws.amazon.com/what-is/blockchain). Therefore, Blockchain technology firstly was used in financial service institutions in the application of Bitcoin or Cryptocurrencies, emerged in 2008, and subsequently its applications broadened to multiple sectors (Rahman, 2021). So, the general public strongly associates blockchain with bitcoin. Bitcoin was indeed the first "product" based on Blockchain technology. People who are infinitely far from cryptography and the ideas of the so-called cryptoanarchy, meaningfully pronounce the word "blockchain", often without even having an approximate idea of what it is. However, the possibilities of the blockchain are not limited to the issue of cryptocurrencies and the implementation of transactions beyond the control of third parties. How important Blockchain for cryptocurrencies business can be represented in the number of cryptocurrencies transaction, outstanding 1900 and still growing (CoinMarketCap, 2017), even though, the escalation number of cryptocurrencies transaction can generate interoperability issues since bitcoin uses are diverse. (Tschorsch and Scheuermann, 2016); (Haferkorn and Diaz, 2015). Blockchain technology recently is the most trending topics, caused by the application of Blockchain technology is being used in a wide range of industries, including supply chain,

business, healthcare, IoT, privacy, and data management, but its application still has limitations particularly across different sectors and industries (Casino et al., 2019).

However, following digital technology is being developed, recently, Blockchain technology can certainly be utilized in marketing activity especially in dealing with Digital Marketing of the company, appeared at post 2015 (Rahman, 2021), even though in the first review, no study discussed Blockchain application in marketing scope (Y. Li et al., 2018). The adoption of blockchain technology to address Digital Marketing Fraud Prevention and Loyalty Programs is still relatively uncommon (Stallone et al., 2021). Moreover, Antoniadis et al. (2019) stated that Blockchain technology applications are just focused on six fields, that are supply chain management, payment processing, marketing management, loyalty programs, digital marketing, reviews, and credential management.

BCT offers security, auditability, resilience, and transparency (Greenspan, 2015); (Christidis and Devetsikiotis, 2016)(Christidis & Devetsikiotis, 2016), in dealing with the problems of customers' transactions order and double-spending (Nakamoto, 2008), so it can be considered a distributed database, enable the company organizing a collection of ordered blocks with immutable committed blocks (Casino et al., 2019). Blockchains feature a dispersed peer-to-peer network that enables non-trusting users to connect with each other verifiably without the requirement for a centralized, dependable authority (Christidis and Devetsikiotis, 2016). Consequently, Blockchain technology is a collection of interrelated processes that provide a variety of capabilities for the Blockchain infrastructure, as illustrated in Fig. 1 (Casino et al., 2019).

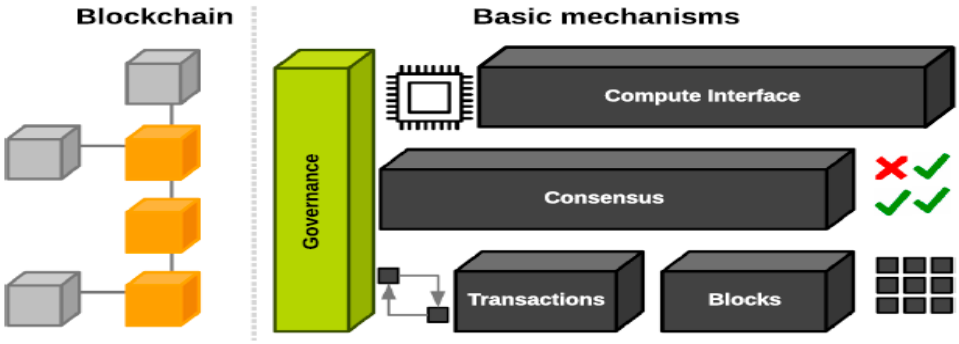

Figure 1. Blockchain Technology Infrastructure

Principles of Blockchain Technology

Despite the complexity of the technology, it is sufficient for a common user to understand the following blockchain technology fundamentals, as follows:

1. Decentralization

Blockchain is a decentralized database system. There is no single central data repository; data is saved on the Computers of each network member. Furthermore, the full blockchain is saved on each of the devices.

Therefore, it is feasible to deactivate 99% of the devices (which is virtually difficult given the millions of copies of the blockchain all over the globe), but just 1% of them will preserve the full database intact. And it will send it to any new devices that are connected to the network.

2. The impossibility of entering false data or changing already made records

In contrast to traditional databases, every information recorded in the blockchain is linked. The blockchain is made up of a series of blocks that are sorted in chronological order. The second block is connected to the first (the "genesis block"), the third to the second, and so on. Simultaneously, each new block added to the chain carries information about the preceding one.

Thus, all blocks and transactions done by network users are linked together using complicated algorithms. A modification to one of the blocks violates the chain's integrity and is rejected by the computers of the other participants. Each new block's legitimacy is likewise confirmed by the participants, and when a broad agreement is established, it is added to the chain.

Each block keeps data regarding user behaviors. If we are talking about the bitcoin blockchain, then data on the latest transactions conducted by users is recorded in the block. However, theoretically, any information that needs to be made publicly available and protected from any editing or deletion can be recorded in the blockchain.

3. Uniqueness and at the same time anonymity of the participants

Every user on the blockchain-based network has a unique identity and a digital signature. At the same time, a person's true personal data may be kept private or made public, according to the user's preferences or the needs of a certain blockchain's algorithm.

Thus, the author wants to consider the problem of decentralized systems used in marketing now and learn about alternative ways of concluding transactions and advertising using blockchain technology.

RESULTS AND DISCUSSION

Fintech showed the first serious interest in blockchain. Firstly, blockchain was already a well—"run-in" technology - the Bitcoin payment network, despite some controversial issues related to the shadow economy and speculation, demonstrated exceptional functional stability. So far, no cases of successful hacking of the network have been registered.

Secondly, the application of blockchain in financial transactions allows:

- To eradicate intermediaries and third parties from any transactions.
- Ensure full publicity and transparency of all actions.
- Solve the issue of trust by automating transactions. The Ethereum blockchain allows you to create so-called smart contracts that are executed automatically as the parties fulfill their obligations.
- Solving the trust and control issues in digital marketing.

Smart contracts and a multipurpose blockchain like Ethereum enable people to go beyond fintech and make interested parties' connections completely transparent - in any sector of human activity where agreements and obligations exist.

It is vital to determine the most pressing issues in digital marketing in order to fully comprehend how blockchain might be helpful..

Fraud. A serious problem with digital marketing. When purchasing impressions on any website, you run the risk of wasting more than 50% of your advertising money since bots will also be seeing your advertisements in addition to actual visitors.

The Methbot botnet's exposure at the end of 2016 provided evidence of the click fraud's enormous scope. A total of $7 billion is lost yearly in the digital advertising sector as a result of fraudulent ad views. Furthermore, this signal will only increase as long as the strategy for advertising in the digital environment remains unchanged.

It is notable that there is now almost no defense against ad-viewing bots. There is no assurance that the shown views were produced by actual individuals, regardless of the analytics solution you employ.

Intermediaries. Advertisers are compelled to cooperate with intermediaries who take on the role of arbitrators when it is hard to trust the website directly. A significant proportion of fraud serves as evidence that referees often struggle to complete their assignments.

In addition, the intermediaries that stand between the platform and the advertiser demand a high fee for their services. The biggest intermediates, like Google or Facebook, are responsible for a significant portion of all marketing costs. These players may be distinguished by their enormous control over the digital advertising industry and questionable effectiveness.

Facebook, for example, has about 2 billion users worldwide. Big data and such a large audience provide social networks a considerable influence on digital marketing as a whole. Many marketers believe it to be overly important.

The transformation of companies like Facebook becoming "digital gardens of data surrounded by a wall" (walled gardens of data). Marketers think they are entitled to access some of this information. Meanwhile, the problem of fraud and intermediaries may be permanently resolved with the usage of blockchain in digital marketing. And here is why.

As we've previously mentioned, blockchain technology can guarantee a network participant's anonymity, uniqueness, and "reality" all at once. While a third party (such as Google, Facebook, or "Yandex") is not a guarantee of the duties in a blockchain transaction, we might think of an advertisement as an agreement between the advertiser, the owner of the website, and the user.

Digital identification without the transmission of personal data will minimize fraud of all kinds and safeguard the user from improper use of his personal data.

Blockchain also has the potential of striking a severe blow to intermediaries in the future by enabling direct control over the placement of advertisements and the allocation of advertising funds. With the transfer of transactions to the blockchain, it will be challenging to generate data for advertising campaigns, although statistics manipulation is now rather straightforward.

Products that enable blockchain application in digital marketing are actively developing. We are at the very beginning of the way of transferring digital advertising to a blockchain basis, and various startups offer their own ways of applying the technology.

MetaX — adChain

adChain is a set of open protocols based on the Ethereum blockchain. At the current stage, a protocol has been implemented that allows network participants to vote for the inclusion of a particular site in the "white" list of sites (sites that do not use cheating and are free from fraud). When consensus is reached by all network participants, the site is added to the list.

adChain network users are holders of adToken tokens (ADT), a cryptocurrency linked to Ethereum. The site owner, who has applied for the inclusion of his domain in the "white" list, deposits a deposit in the form of tokens, after which network users can challenge the application for some time, also placing a deposit in tokens for this.

As a result, if the majority of users have not questioned the legitimacy of the site, it is included in the "white" list.

Marketers, like the founders of adChain themselves, do not consider the scheme ideal. After all, it is people who create a registry of "white" sites. What are they guided by, considering this or that site free (or not) from fraud? In addition, there are no significant incentives for users of the system to approve or challenge the domains being added.

However, this is only the first protocol presented by the startup. Developers are announcing new mechanisms to increase control over advertising campaigns.

Brave Browser and Basic Attention Token (BAT)

The Basic Attention Token initiative utilizes the Ethereum network as well. However, instead of simple voting and whitelisting, the startup claims to create an entire advertising ecosystem in which advertisers, platforms and users exchange BAT tokens (again related to the Ethereum cryptocurrency).

Users wishing to become project participants must install the Brave browser. Its peculiarity is to ensure a high degree of anonymity of the user: any attempts to secretly collect data from the sites that the user visits are blocked. The browser also has a built-in adblock mechanism — any third-party advertising in it is blocked by default.

At the same time, Brave monitors the activity of users and offers them the viewing of relevant, verified and secure advertising for a reward accrued in BAT tokens. In turn, the sites that place ads receive tokens for each viewing of the ad.

All users of the network remain completely anonymous. In this way, an ideal balance is achieved between privacy for the user and accurate targeting for the advertiser, who pays only for clicks of real target users. In the future, the project announces the possibility for users to completely disable advertising. This option will also be paid for with BAT tokens.

BAT is so far the most effective way to combat fraud and intermediaries in digital marketing, based on blockchain. The only serious limitation that can hinder the development of the project is its binding to a separate browser. Probably, if the developers can transfer the functions of Brave to Firefox or Chrome using extensions, the project has a great future ahead.

AdEx — decentralized advertising exchange

The principle of operation of AdEx is similar to the BAT project. It was also based on the Ethereum blockchain (the developers later switched to the private Chinese NEO blockchain) and has its own ADX tokens. The beta release of the AdEx ecosystem is scheduled for January 2018.

AdEx is an advertising exchange where transactions will be conducted using smart contracts that safeguard advertisers, publishers, and users from fraud, improper advertising, and the exploitation of sensitive data.

The advertiser will be able to get accurate, validated information on ad impressions attributable to the blockchain. On their own AdEx profile page, users control advertising and

only view information that corresponds to their interests, so ensuring proper targeting and relevancy of ads.

The project aspires to provide the highest level of targeting, say, up to the most that a certain user is ready to pay on a trip to a specific location (if we are focused about travel lovers and relevant advertising).

Platforms for advertising have complete control over the material that appears on their sites. Additionally, customers will have the choice of accepting or rejecting the advertiser's offer. This is particularly crucial when the website values its reputation and carefully records the ads that consumers see.

Unfortunately, modern advertising networks do not always show the advertising that is acceptable for the site, since the work of their algorithms is often not too predictable.

New York Interactive Advertising Exchange (NYIAX)

NASDAQ, the largest American stock exchange trading shares of high—tech companies, announced NYIAX - the first exchange for trading premium-level advertising inventory. The site should start working at the end of 2017.

The execution of contracts concluded by NYIAX players is automated using blockchain. When fulfilling the obligations assumed by both parties, the transaction is considered concluded. Presumably, for the first time, digital advertising inventory will be traded on the exchange, and in the future it is planned to place more traditional TV advertising.

It is noteworthy the statement of Richard Bush, Director of Technology at NYIAX, who believes that the advertising industry in a sense missed the automation revolution, which was understood and adopted by Wall Street figures in time.

Papyrus

A Russian development, which, according to the developers, is "a highly scalable decentralized ecosystem for programmatic advertising." As in similar projects, the main idea of Papyrus is to reward users with cryptocurrency for viewing safe and relevant advertising.

Theoretically, an important advantage of Papyrus over the same BAT Project is greater freedom for users to dispose of the reward for viewing ads. According to the developers, the received cryptocurrency will be able to pay for third-party services, such as mobile communications, Internet, access to various services and others.

CONCLUSION

People perceive blockchain technology as a panacea for digital fraud and inefficient intermediaries. To a greater extent, the enthusiasm is shared by representatives of fintech, and by digital marketers.

The main reason is **banal** — while marketers for the most part still poorly understand the principles of the blockchain and are not fully aware of the practical possibilities that it provides. But there are also technical limitations that prevent the immediate implementation of blockchain when it comes to digital marketing.

Firstly, blockchain has not yet received approval from the industry as a standard, especially for SMEs. The operation of the technology depends on numerous nodes, the

functioning of which is provided by network participants — either enthusiasts or interested parties. If there are few participants in the network, it will not be efficient and workable.

Secondly, blockchain is largely a theoretical development, the practical use of which remains quite a niche phenomenon so far. The full implementation of the ideas declared in the last year by numerous blockchain startups (the quantity and quality of which sometimes reminds of the good old dot-com bubble) can take years.

Thirdly, a serious technical limitation is the scalability of blockchain transactions. For example, the Ethereum blockchain, the most popular and functional today, allows for 20 transactions per second.

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