International Journal of Science and Research Archive
eISSN: 2582-8185
Cross Ref DOI: 10.30574/ijsra
Journal homepage: https://ijsra.net/

(RESEARCH ARTICLE)

# Role of blockchain in ensuring Ad transparency

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International Journal of Science and Research Archive, 2026, 18(03), 934-939

Publication history: Received on 04 February 2026; revised on 11 March 2026; accepted on 14 March 2026

Article DOI: https://doi.org/10.30574/ijsra.2026.18.3.0522

## Abstract

Programmatic marketing and online platforms have contributed to the growth of digital advertising. Nonetheless, the growing complexity of the advertising supply chain has raised serious questions about accountability, fraud, and transparency. This study examines how blockchain technology could enhance the digital advertising ecosystem by increasing transparency. The blockchain is a decentralized, unchangeable ledger of transactions for advertisements, allowing real-time verification of images, clicks, and money lodgments. With blockchain technology, advertising fraud, unknown charges, and information asymmetry in Internet advertising markets can be resolved, the number of intermediaries can be reduced, and data credibility can be ensured. It is presented through a qualitative approach, drawing on secondary sources, such as academic publications and reports on the application of blockchain-based solutions, to assess the practicality of providing greater transparency and trust for advertisers, publishers, and the advertising platform.

**Keywords:** Blockchain technology; Digital advertising; Advertising transparency; Advertising fraud; Programmatic advertising

## 1. Introduction

### 1.1. Growth of Digital Advertising and Transparency Challenges

Digital advertising has become an important component of the marketing ecosystem worldwide due to the rise of automated, data-driven advertising platforms. Nevertheless, the rapid expansion of programmatic advertising has raised grave concerns about accountability, openness, and goodwill among publishers, advertisers, and intermediaries. Due to the digital advertising supply chain often involving demand-side platforms, supply-side platforms, and ad exchanges, advertisers may have difficulty tracing how their advertising dollars are used. Branders typically do not influence the manner of impression delivery or the authenticity of the advertised audience. The research reveals that the complexity of the advertising ecosystem facilitates fraudulent behavior, including bot traffic and misleading impressions, and the annual losses amount to billions of dollars [1]. Digital advertising is now open, which makes it a requirement for both marketers and software developers.

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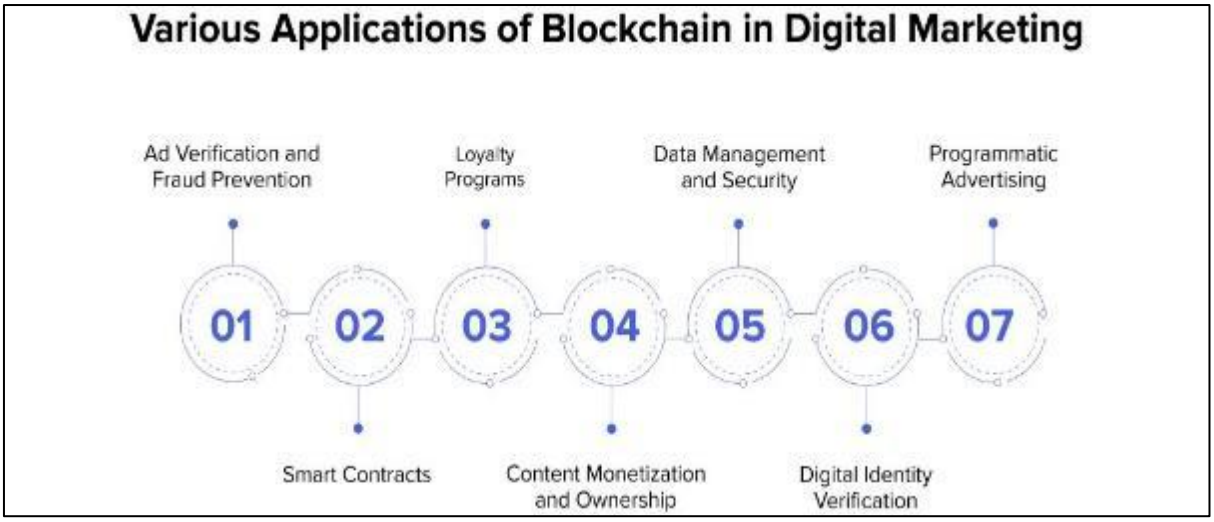


**Figure 1** Applications of Blockchain in Digital Marketing [2]

### 1.2. Blockchain as a Technological Solution

The problem of accountability and transparency in digital advertising can be addressed with blockchain technology. The threat of data manipulation or tampering is minimized because blockchain is an immutable, decentralized registry that logs and verifies transactions on a distributed network. With the addition of blockchain, every stakeholder in the advertising ecosystem can have a clear, transparent history of all advertising transactions, including ad placement, impressions, and payments. Advertisers can help prevent fraud by monitoring how their money is spent across the advertising supply chain. Moreover, automated smart contracts based on blockchain technology may require participants to meet certain advertising conditions before receiving payment, thereby providing them with greater confidence [3]. The blockchain, as a technology, is thus gaining increasing popularity among scholars and industry professionals and aims to make digital advertising more transparent.

## 2. Literature Review

### 2.1. Transparency Issues in the Digital Advertising Ecosystem

The digital advertising environment has grown exponentially through the integration of programmatic advertising, which automates the process of acquiring and selling web ads. The system lacks transparency due to the presence of many intermediaries, including supply-side platforms, demand-side platforms, and ad exchanges, despite being effective. Advertisers are usually unable to understand how their advertising funds are disbursed and how the intended audience views their adverts. A lack of knowledge asymmetry among players in the internet advertising industry can lead to inefficiencies and a lack of trust [4]. Fraud, ad misplacement, and concealed transaction charges in online advertising markets undermine leadership and transparency in the advertising supply chain [5].

### 2.2. Blockchain Technology and Its Core Characteristics

Blockchain technology has been cited as an innovative approach to making digital networks more transparent. The system records transactions in a distributed ledger, ensuring security and irreversibility in a decentralized manner. Blockchain provides a reliable method for myriad stakeholders to confirm transactions because it can store immutable data. A peer-to-peer electronic cash system called blockchain, the technology of Bitcoin, that does not require centralized intermediaries [6]. Expanding on the concept that blockchain enables records to be kept transparently and unbreakably, which is most suitable in fields where accountability and trust are of high priority [7].

### 2.3. Application of Blockchain in Digital Advertising

Scholars and business professionals are starting to discover how blockchain technology can help eradicate transparency issues in the digital advertising supply chain. All stages of an advertising transaction (clicks, ad impressions, and payments) can be registered on a blockchain to enable interested parties to access real-time data on campaign performance. Blockchain technology can reduce fraud in digital environments by providing unalterable records that improve accountability and traceability [1]. Blockchain-powered solutions can enable advertisers to identify where their ads appear and ensure that real people, rather than bots, generate impressions [3]. Because blockchain-enabled

smart payments can be automated, advertisers can be paid only for validated advertising results. These characteristics show how blockchain technology can revolutionize the digital advertising industry by boosting transparency, reducing fraud, and providing players with greater security.

## 3. Methodology

### 3.1. Research Design

The qualitative and conceptual research approach seeks to establish how blockchain technology can make the digital advertising industry even more transparent. The qualitative method will be suitable, as the research will review recent scholarly and trade journals and technological platforms related to blockchain and online advertising transparency. Qualitative research can be used to examine the new technical phenomena that demand theoretical understanding and conceptualization [8]. By reviewing academic discussions and blockchain implementations, the proposed study seeks to assess the extent to which blockchain-based mechanisms can enhance accountability and curb fraud in advertising networks.

### 3.2. Data Sources

The secondary data on blockchain technology and digital advertising transparency used in the proposed research were primarily obtained from peer-reviewed academic journals, industry magazines, and conference papers. Since the cited references are credible and scholarly, the required material was obtained from academic sources, including Google Scholar, Scopus, ScienceDirect, etc. Since secondary data provide the researcher with knowledge, secondary data analysis enables the synthesis and identification of patterns in studies that did not use primary data collection [9]. Some of the selected sources include blockchain technology, advertising fraud, and openness in digital marketing platforms.

### 3.3. Analytical Approach

The data obtained were thematically analyzed to identify the most common concepts related to accountability, transparency, fraud prevention, and blockchain, and to apply them to advertising systems. Through a critical examination of findings from many studies, themes emerged that describe how the qualities of blockchain, including smart contracts, decentralization, and immutability, could be used to promote transparency in the transactions of advertisements. Thematic analysis is a method for identifying themes and tendencies in qualitative data [10]. This approach will systematize prior research and consider how to utilize blockchain technology to address transparency in digital advertising markets.

## 4. Analysis and Discussion

### 4.1. Enhancing Transparency in the Advertising Supply Chain

The digital ad ecosystem includes publishers, advertisers, ad exchanges, and other tech providers. The customized ads have been distributed more than the programmatic ads. This, however, has created transparency problems because in some cases, the advertisers are not in control of the entire advertising supply chain. Third parties are often utilized by marketers to deliver campaign outcomes, resulting in information asymmetry and institutional mistrust. Blockchain technology has the potential to be used as a decentralized system by storing advertising transactions on a shared ledger accessible to all users, thereby enhancing transparency. This type of technology allows stakeholders to trust centralized intermediaries to authenticate clicks, ad impressions and cash transactions. It has been discovered that decentralized ledgers enhance transparency because they can be verified by multiple actors, and any unlawful change to the data recorded in the ledgers is prohibited [11]. Blockchain technology can therefore result in a more open advertising system, allowing marketers to monitor their marketing budgets.

### 4.2. Reduction of Advertising Fraud through Blockchain

Fraud in advertising is a major challenge to the financial activities of the digital marketing industry, with fake impressions, domain spoofing, and bot-generated traffic among the methods employed to perpetrate the crime. This kind of fraud not only leads to huge losses for digital advertisers but reduces trust in digital advertising platforms among the masses. The traditional advertising infrastructure cannot always identify fraudulent behavior because it cannot provide the security of transaction data in the central system, where it is neither transparent nor subject to real-time checks. These issues can be resolved with blockchain technology, which provides a secure, immutable database in which all interactions with advertisements are recorded. After advertising data has been verified and stored on the blockchain, it is difficult to change or fake. Research on blockchain-based verification methods has demonstrated that decentralized

registries have the potential to improve data quality and reduce fraud in digital transaction manipulation [12]. Thus, advertisers will be able to enhance the trustworthiness of digital advertising KPIs by adopting blockchain-enabled systems to ensure that real customers generate such metrics.

### 4.3. Role of Smart Contracts in Automated Advertising Transactions

Another relevant use of blockchain in the digital advertising sector is smart contracts. These contracts are self-executing digital contracts that automatically take preset actions when certain conditions are met. Smart contracts may be used to automate the transfer of payments between advertisers and publishers upon the achievement of a specific performance condition, such as verified impressions or user interactions. This is an automated methodology that helps avoid intermediaries and minimizes the time required to settle payments. Moreover, smart contracts enhance transparency because payments can occur only after campaign outcomes are verified on the blockchain. Smart contracts can enhance the efficiency of digital transactions by eliminating manual verification and reducing the administrative costs of managing contracts under the conventional approach [13]. Thus, integrating smart contracts into the advertising system would greatly enhance the effectiveness and consistency of advertising deals.

### 4.4. Limitations and Implementation Challenges

Transparency can be enhanced with blockchain technology, but multiple obstacles prevent its widespread adoption in the digital advertising industry. Millions of transactions are processed by major advertising platforms in a single second, which is why blockchain network scalability is a major limitation. A large number of blockchain networks are not yet at a stage where they process as much transaction volume as they need to. The greater number of smaller organizations may limit their ability to adopt, given the high degree of technological expertise and financial resources required to create blockchain-based advertising tools. Blockchain networks pose privacy and regulatory risks due to their ability to store information across distributed systems and to be accessed by various parties. Research on the general spread of blockchain technology shows that technological limitations, incompatibilities, and uncertainty in the regulatory environment must be overcome before blockchain solutions can be widely adopted across industries [14]. Thus, although the blockchain has high potential to bring greater transparency to digital advertising, technological advancement and cooperation with the industry should be further advanced to realize the technology's full potential.

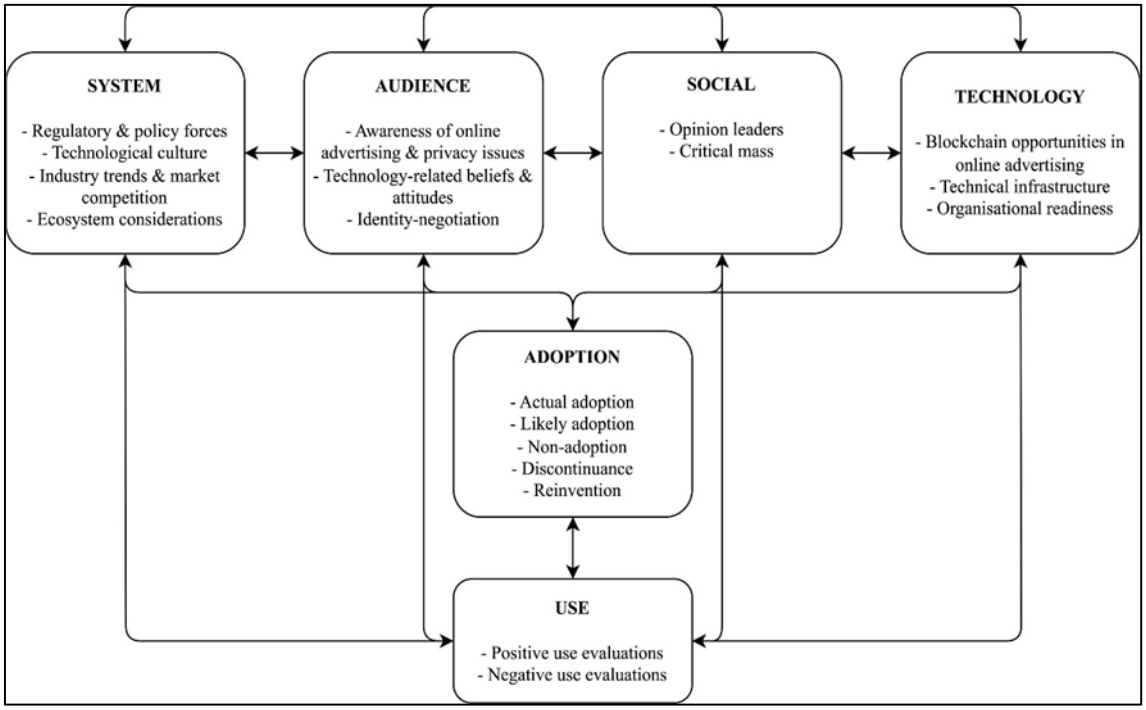


**Figure 2** Blockchain Adoption in the Online Advertising Ecosystem [15]

## 5. Conclusion

Digital advertising has had a radical transformation of the marketing industry, but there are still burning issues with accountability, transparency, and advertising fraud. Due to the multicultural nature of the advertising supply chain,

which involves numerous intermediaries, advertisers are frequently unable to determine how their money is used and whether real customers see their advertisements. One rather interesting technical solution to such transparency issues is blockchain technology. The decentralized, non-reversible ledgers of blockchain enable all stakeholders within the advertising landscape to access verified transaction records and trace real-time advertising activity. Publisher, advertising sites, and advertisers are more confident in this common, undoing record. Studies of blockchain applications in digital systems have suggested that decentralized ledger technology has the potential to enhance the quality, accountability, and transparency of data across digital platforms. Thus, the incorporation of blockchain technology into digital advertising can help minimizing fraud and significantly enhance the transparency of advertising transactions.

### *Recommendations*

The following useful actions should be considered to guarantee the blockchain technology's optimum usefulness in advertising transparency:

- **Adoption of blockchain-based advertising platforms**

Advertising agencies should use blockchain technology to keep transparent, verifiable records of impressions, clicks, and ad-related payments.

- **Development of industry standards**

Advertising associations and regulatory agencies should provide common blockchain deployment standards to guarantee consistency across digital advertising networks.

- **Collaboration among stakeholders**

To create a unified blockchain that improves transparency in the advertising supply chain, publishers, advertisers, tech companies, and regulators should collaborate.

- **Investment in technological infrastructure**

Scalability and integration problems related to the adoption of blockchain should be addressed by organizations that invest in technology infrastructure and research.

- **Future research and innovation**

Scholars need to develop studies that will evaluate the value of blockchain in online advertising and its long-term potential to eliminate fraud and improve accountability.

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