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## The impact of blockchain on the digital advertising ecosystem: Preliminary results of an exploratory analysis

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### Abstract

The field of digital advertising has grown rapidly in recent years. The paper is a first attempt to explain how online advertising works in general, moving through the many types of digital advertising before exploring the ramifications that the GDPR has had since 2018, both for consumers and for the brands that collect data. Following a general explanation of how blockchain technology works, the technology's potential applications are quickly demonstrated. Specifically, the study shows how frauds could be reduced, increased protection, and the number of intermediaries per transaction halved, if not eliminated. The paper adopts a quantitative method by structural equation modelling, providing some preliminary results. The field research was conducted with a questionnaire useful to examine users' worries about providing/disclosing personal information over the Internet. At the end of the paper, some suggestions and implications are provided considering the questionnaire's results.

**Keywords:** *digital advertising, blockchain, privacy concerns, personal data, structural equation modeling*

### 1. Introduction

Digital advertising has grown significantly over the years, and personal data has become a valuable commodity for advertisers (Cabanas *et al.*, 2018; Estrada-Jimenez *et al.*, 2019). However, users are always more and more concerned about the collection, storage, and use of their personal data by advertisers (Broeck *et al.*, 2017). These concerns led to the implementation of new regulatory frameworks, such as the General Data Protection Regulation (GDPR) (Belen-Saglam *et al.*, 2023).

Previous research has pointed out the potential advantages of blockchain in digital advertising, such as increasing transparency and reducing fraud (Joo *et al.*, 2023). Additionally, researchers proposed various solutions to address privacy concerns, such as zero-knowledge proofs, homomorphic encryption, and decentralized identity management systems (Liu *et al.*, 2020; Parssinen *et al.*, 2018). However, there are also criticalities in the usage of blockchain in digital advertising, especially in terms of de-anonymization and the need for interoperability between different blockchain platforms (Liu *et al.*, 2023). Therefore, further research is needed to explore the potential benefits of blockchain in digital advertising considering the need to protect users' privacy (Matthews and Tucker, 2023).

In this paper, authors take a step forward in this direction by analyzing the relationship and a precise research question (RQ), that is: *How the lack of transparency and security (i.e., not adopting blockchain) can affect the potential of online brand communication in establishing profitable relationships with customers?*

## **2. Theoretical Background**

Blockchain technology has received growing attention in recent years due to its potential to revolutionize several industries, including finance, healthcare, and supply chain management (Beck *et al.*, 2017). As a result, the literature on blockchain is large and composite and includes studies from different disciplines, including computer science, finance, economics, and law (Sestino *et al.*, 2022). To date, the application of blockchain in the finance realm has been the main focus of Scholars, particularly in the context of cryptocurrencies such as Bitcoin (Crosby *et al.*, 2016).

Blockchain has also been applied in other areas, such as supply chain management (Faggioni *et al.*, 2023), education (Bhaskar *et al.*, 2021), and healthcare (Hasselgren *et al.*, 2020). Blockchain has many benefits, including increasing security, transparency, and efficiency. Indeed, blockchain's decentralized nature eliminates the need for intermediaries, reduces costs and improves efficiency (Sestino *et al.*, 2022).

However, extant literature also called for more research and recognized the crucial role of blockchain in diminishing the privacy concerns of users in the online world given its characteristics (Liu *et al.*, 2020). As a result, today there is still scope for further research in this direction, as expressed by many recent calls for research (Matthews and Tucker, 2023). Indeed, research has repeatedly shown that customers worry about their transaction anonymity and confidentiality (Liu *et al.*, 2023). These concerns are caused by the increased risk of improperly obtaining, misusing, and divulging their personal data (Joo *et al.*, 2023). Brands are today able to identify more easily and track, collect and process consumer information with blockchain and with new data collection technologies and data mining techniques (Parssinen *et al.*, 2018). This creates new problems of intrusiveness in the privacy of online shoppers (Ullah *et al.*, 2023).

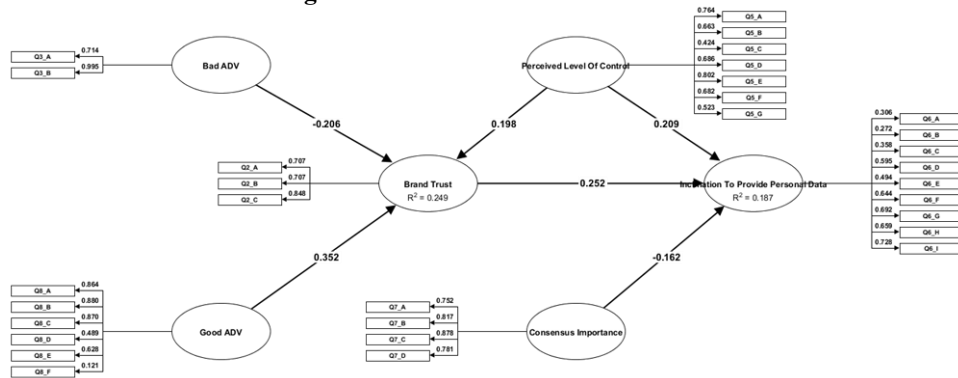
## **3. Methodology and results**

A 12-item structured questionnaire was administered online and distributed through leading online social media platforms (Chaturvedi *et al.*, 2021) such as Facebook, LinkedIn, and Instagram, and direct mailing or electronic word-of-mouth (eWOM). At the end of the process, the authors collected 1,000 responses. Responses from social media were distributed in the following percentages: Facebook, 33%; LinkedIn, 32%; Instagram, 20%; and direct mailing or eWOM, 15%.

Multiple-choice and Likert scales were adopted in the questionnaire and subsequently analyzed with statistical methods and with ADANCO software (Basile, 2019). The authors first developed a Path Model, a graph able to represent the links between latent variables. The relation used is defined as a reflexive type, i.e., the latent variable forms the manifest variable. The respondents were equally distributed among the genders. The age of the interviewees was divided as follows: 18-25 (55%), 26-35 (23%), 36-45 (12%), 46-55 and 56+ (10%). The quantitative analysis was based on a

global sample of digital users who used the internet and online platforms from January 2020 to June 2022. For reasons of space, the authors directly report the measurement model below.

**Figure 1.** The measurement model



**Source:** Authors' elaboration

From the graphic representation of the model (Figure 1 above), the authors observe that:

- Bad ADV (advertising) and Good ADV influence Brand Trust. This led authors to believe that trust in a brand (as regards the consent of information) was also given by how the ADV policy is set and therefore is perceived as "aggressive" or as "correct" facts. If perceived as "bad", there is a negative impact coefficient on "Brand Trust" which indicates that as the perception of "bad ADV" increases, there is a decrease in "Brand Trust".

- The propensity (inclination) to provide personal data on the other hand is influenced by Brand Trust, the Perception of control and the importance of consent, although the perception of control and "Brand Trust" have a positive influence on the inclination, having a high consideration of the importance of consent reduces the inclination to provide personal data.

In addition, it is predicted that consumers' privacy concerns regarding the use of their personal information by an e-tailer would impact their brand trust perception directly and indirectly through trust in and commitment toward the e-tailer.

The model's reliability was assessed as shown in Figure 2.

**Figure 2.** Model's reliability

Construct	Dijkstra-Henseler's rho ( $\rho_A$ )	Jöreskog's rho ( $\rho_C$ )	Cronbach's alpha( $\alpha$ )
Bad ADV	4.0422	0.8541	0.7829
Good ADV	0.8180	0.8282	0.8086
Brand Trust	0.6464	0.7996	0.6241
Perceived Level Of Control	0.8203	0.8396	0.7983
Inclination To Provide Personal Data	0.7402	0.7830	0.7439
Consensus Importance	0.8594	0.8826	0.8259

**Source:** Authors' elaboration

Preliminary findings showed authors what are the most important questions that form the latent construct, which can determine important reading keys, for example:

- The Q2\_C question: *“I trust my favourite brands and would voluntarily provide information about my interests in order to receive personalized promotions and ads”* is the strongest question to form the “Brand Trust” construct since it has the highest coefficient in the block of questions that form the variable examined.

- The same can be done for the inclination to provide personal data, noting that the most important question that builds the latent variable is question Q6\_I: *“Which of the following information would you provide in exchange for free content?”*.

- The importance of consent is influenced mostly by question 7: *“How important is your consent when: a) The site sells or shares your info with third parties; b) The site tracks movements within the site; c) The site tracks your online purchases and d) The site personalizes your online experience based on your preferences”*.

#### 4. General discussion and limitations

Our study advances the field of advertising by uncovering the impact of blockchain on users' privacy concerns. The findings suggest that customers value benefits more than they do risks. Businesses should take advantage of this knowledge and subsequently shape their value propositions to customers. Therefore, customers are willing to take some risks to receive hedonic and utilitarian benefits. On the other hand, online service providers are called to put additional efforts into making the benefits salient and distinct through effective promotional plans. In doing so, these providers can further entice customers to take the risk of sharing personal information and enjoying personalized services. A solution proposed by the authors consists of offering dynamic user experiences based on personalized information.

As with any research, the study has limitations from which future research avenues can be derived. Future research should broaden the sample size and demographics to ensure broader representation. Moreover, these are just preliminary findings and should be further investigated with other methods (e.g., with experimental methods). In this way, also some biases could be avoided. Finally, extending this research to other technological domains can strengthen the generalizability of our findings.

#### 5. Practical implications and conclusions

In the context of marketing for well-being, health, and care, blockchain technology can be used to:

*Track the effectiveness of marketing campaigns:* Blockchain can be used to track the results of marketing campaigns, such as the number of impressions, clicks, and conversions. This information can be used to improve the targeting and effectiveness of future campaigns.

*Protect user privacy:* Blockchain can be used to protect the privacy of users who participate in marketing campaigns. For example, blockchain-based solutions can be used to collect and store user data in a secure and anonymous manner.

*Encourage engagement:* Blockchain can be used to encourage engagement with marketing campaigns. For example, blockchain-based solutions can be used to reward users for completing certain tasks, such as watching a video or clicking on an ad.

*Verify the authenticity of products and services:* Blockchain can be used to verify the authenticity of products and services. This can be helpful in the context of marketing for well-being, health, and care, where consumers need to be confident that the products and services, they are using are safe and effective.

Overall, blockchain technology has the potential to revolutionize the digital advertising ecosystem and make it more efficient, transparent, and secure. It can also be used to create new types of marketing campaigns that are more personalized and effective.

Some examples of how blockchain is being used in digital advertising and marketing for well-being, health, and care are AdChain; HealthCoin and MediLedger. These are just a few examples of how blockchain is being used in digital advertising and marketing for well-being, health, and care. As the technology continues to develop, we can expect to see even more innovative and effective applications of blockchain in this space.

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