

Dr. Lidia MAESTRO-ESPÍNOLA

Complutense University of Madrid, Spain. lidiamae@ucm.es. <http://orcid.org/0000-0003-4866-3412>

Dr. David CORDÓN-BENITO

Complutense University of Madrid, Spain. dcordon@ucm.es. <https://orcid.org/0000-0001-5603-0792>

Dr. Natalia ABUÍN-VENCES

Complutense University of Madrid, Spain. nabuinke@ucm.es. <https://orcid.org/0000-0002-4153-9390>

Study on ad metrics fraud: development, analysis and mitigation tools

Estudio sobre el fraude de métricas publicitarias: evolución, análisis y herramientas para la mitigación

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Abstract

This study seeks to analyse fraud in those metrics serving as a reference value in the commercialisation of digital advertising spaces. Digital media need to optimise revenue and a major recourse is the business models based on advertising facing the phenomenon of fraud. This work focuses on analysis of the aspects that deter advertising investments, especially the problems that metrics fraud entails, and measures implemented to improve the transparency and quality of media like the advertising media. It is based on the idea that the control of metric fraud makes it possible to attract the attention of advertisers, improve advertising efficiency and optimise the benefits of digital media. A qualitative methodology afforded in-depth interviews to professionals in the sector who analyse the different types of fraud and the prevention strategies carried out by digital media. The results reveal inequality in the management of investment in digital media for advertising and a conservative vision.

Keywords

Metric fraud; advertising revenue, business models; digital media; quality; transparency

Resumen

El objetivo de este trabajo es el análisis del fraude presente en las métricas que sirven como valor de referencia en la comercialización de la publicidad digital. Los medios digitales necesitan optimizar los ingresos captados y una de sus principales apuestas son los modelos de negocio basados en publicidad que se enfrentan al fenómeno del fraude. Este trabajo se centra en analizar los aspectos que frenan las inversiones publicitarias, especialmente los problemas que conlleva el fraude de métricas y las medidas que se implementan para mejorar la transparencia y la calidad de los medios como soportes publicitarios. Se utiliza una metodología cualitativa, basada en entrevistas en profundidad a profesionales del sector, que parten del análisis de los diferentes tipos de fraude y las estrategias de prevención llevadas a cabo por los soportes digitales. Los resultados revelan una desigualdad en la gestión y la adopción de una visión conservadora ante este fenómeno.

Palabras clave

Fraude de métricas; ingresos publicitarios; modelos de negocio; medios digitales; calidad; transparencia

1. Introduction

Digital advertising spaces are being sold using new sales methods. These have led to a transformation of the sector but they also create various challenges for the advertising market. As digital media budgets grow, new scams are being developed which generate higher profits through advertisements not seen by real people. The advertising sector as a whole is harmed by a lack of quality and transparency, at a time when investment must be efficient if it is to generate trust.

Digital advertising is sold in an increasingly complex market that has seen an increase in exchanges and where advertisers are more exposed to different forms of fraudulent behaviour (Callejo, Cuevas, Cuevas, Esteban-Bravo and Vidal-Sanz, 2020). The revenue-generating strategies adopted by the digital media have been modified to try to optimise the income they obtain, which comes mainly from advertising. This study sets out an analysis of the work of the main operators in the sector and their strategic adaptation to the different fraudulent behaviours arising from the new methods of selling digital advertising. There are many dimensions that hold back the growth of the income earned, but in this research, we will focus on fraud involving digital metrics, looking at its growth and importance within the sector. According to the report produced by Integral Ad Science (2019), for 52% of professionals managing advertising within advertisers and for 69% of agency professionals, fraud involving metrics is one of the main arguments against increasing investment in digital advertising. These figures, along with estimates of the losses in digital investment suffered, tend to vary due to the complexity of this issue and the different conflicts of interest, but they do point to concerns for advertisers, advertising platforms and other companies operating in the sector. A calculation by White Ops and the Association of National Advertisers estimates the figure for losses due to fraud involving metrics at 5.8 billion in 2019. This suggests that a considerable and concerning amount of advertising investment has no impact on the user or fails in relation to its quality, specifically the accuracy of the measurement data. This figure could reach 23 billion globally according to the cybersecurity company Cheq.

The development of technology has eroded the traditional commercial model that used to govern the sale of digital advertising space. New sales models have been sought to increase the quality of advertising investment, such as qualitative spaces or other special initiatives. The very evolution of the sector, and its necessary transformation towards verified systems that provide greater security against the incidents enabled by the technology, creates the need to look in greater depth at the issues faced by the sector.

The search for solutions involves several challenges discussed by the professionals interviewed in this study. Advertisers want to know where their advertising investments are going and the media have to offer quality in advertising mediums (improve the verification of metrics) to optimise the sale of their spaces.

2. Theoretical framework

2.1 The importance of fraud in advertising investment

Advertising continues to be one of the main sources of income for many digital media outlets, and in some cases, it is their only one. The business model based on advertising income plays a key role in financing that which is "free" (Jansen, 2007). For example, in digital headers we see the need for the recasting of the business model and its adaptation to digital convergence (Casero-Ripollés, 2010). "After twenty years of trial and error, the conclusion drawn by the industry is that none of them has yet been able to generate the required amount of money to make the current model of online journalism viable" (García-Santamaría, Pérez-Serrano and Maestro-Espínola, 2016: 401).

In parallel with the platforms having to adapt to the digital environment, the advertising sector has undergone its own transformation. First, many communication techniques have appeared where the consumer now plays a leading role (Carcelén, Alameda and Pintado, 2017) and second, the methods used to sell digital advertising spaces or impressions have changed. These changes to sales methods can sometimes be harmful.

Since the appearance of the first banner, digital advertising space has been sold using purchasing methods inherited from the analogical media outlets, such as cost per thousand impressions (CPM). The pay per click model led to greater efficiency through harnessing effectiveness, but also opened the door to fraud. Although other options have been added, such as Cost per View (CPV), Cost per Engagement (CPE), Cost per Day (CPD) and Cost per Acquisition (CPA), and these are now established in the digital ecosystem, click spammers are one of the fraud options used by companies to beat the competition or artificially increase their advertising prices. Billions in losses have been attributed to this type of fraud. It represents between 10% and 40% of annual income and creates a challenge for the regulation of fraud given the failure of the industry and legislators to take it seriously (Nadini, 2019). In the digital advertising industry, the most conservative estimate shows that over 10% of all advertisements are consumed by bots or fraudulent impressions (Zhu, Tao, Wu, Cao, Kalish and Kayne, 2017), which means

that there is a high risk involved in any investments made by advertisers. There are thousands of devices used to imitate people and harm the advertisers who pay for all the fake clicks generated in the web environment (Maestro, Córdón and Abuín, 2018). This type of fraud is one of the most common, although there are also tools to prevent it. In recent years, many people, and especially influencers, have been accused of using it. They are said to be buying followers and likes, in a type of fraud that concerns the brands (Iglesias, 2017). Effective ways to detect fraud are often hindered for several reasons, such as professionals who tolerate fraudulent traffic due to little awareness of it, a lack of knowledge by the customers, the existence of inefficient measuring systems or the unrealistic expectations of customers (Dörnyei, 2020).

The goal of the traditional business model is to obtain the most income through campaigns, but technology adds other criteria such as guaranteeing the satisfaction of the media, advertisers and advertising networks, while preventing any type of fraud in the advertising ecosystem (Miralles, 2017). The agencies say that they implement measures to detect fraud, but the information they end up providing is extremely limited. Research such as that by Callejo et al. (2020) provides an argument to counter the industry's claim that it is efficiently filtering out screen fraud.

These issues have been exacerbated by advances in technology, which have affected the way in which advertisers buy media space and how the media sells its spaces. The technological ability to find, categorise and log large audiences has led to the development of programmatic purchasing, which provides advertisers with a large number of pieces of data that affect their strategies (Nelson-Field, 2020). "More than the automation of a manual task, programmatic represents a new way to plan resources in an online environment" (Garrido, Caerols and García-Huertas, 2018: 268).

Programmatic advertising allows digital advertising buyers to buy "convenient" ad impressions through real-time bidding (RTB). However, this option has led to a new type of advertising fraud known as domain spoofing, where fake impressions are sold, claiming that they are mediums of high value (Bashir, Arshad, Kirda, Robertson and Wilson, 2019).

Campaigns conducted using programmatic advertising have also led to improved results in other areas, such as optimising the parameters of user profiles and media websites. The study by Miralles, Qureshi and Mac (2019) aimed to identify configurations that maximise both the number of impressions as well as their average profitability, and their conclusions indicate that the following complementary strategies must be implemented to increase profitability:

- Selecting multiple configurations with a small number of views instead of a single configuration with a large number.
- Discarding views in accordance with cost and profitability thresholds.
- Analysing a small section of the full data, extrapolating the solution and increasing the search space by including solutions under the required number of visits.

According to the authors, this way of optimising campaigns could be offered to advertisers by programmatic platforms as a way to make their investments more profitable.

The potential for fraud does not only lead to economic harm, but also affects the effectiveness of digital advertising. Goldfarb (2014) believes it is essential to comprehend advertising efficiency if we are to understand the impact of selling advertising impressions through bidding, which has to comply with both privacy and antitrust laws.

The data used to underpin programmatic purchasing is drawn from consumer behaviour. Increased knowledge of this issue makes it possible to better integrate impressions, because context, the content of the advertisement and brand recall lead to an increase in efficiency (De Pelsmacker, Geuens and Anckaert, 2002). Advertisers can even increase the number of visits by 12.7%, and the number of expected conversions by 13.8% by modifying the creative content shown to the individual in response to the content and personal history of previously viewed impressions (Braun and Moe, 2013).

In general, the most profitable impressions must be prioritised if advertising networks are to increase their income. Artificial Organic Networks (AON) make it possible to predict the probability that a user will click on an advertisement (CTR, click-through-rate), which is the most important metric for measuring profitability (Miralles and Ponce-Espinosa, 2015). However, all these possibilities diminish where any type of fraud exists.

Lastly, to assess the importance of fraud for the sector's advertising investments, it is important to have estimates of its evolution. However, this task is complex due to conflicts of interest. Metrics are the foundation for the entire sales system and the interested parties involved might be reluctant to

recognise their lack of accuracy. This can be seen in the huge difference between the estimated figures and the responses obtained from professionals. In general, the global cost of fraud is 3.8% of advertising spend, which stood at USD 591 billion in 2019, according to GroupM.

Table 1. Estimated advertising fraud by region, 2020

| Region | IVT percentage | Digital advertising spend (Millions) | Fraud (Millions) | Share of fraud |
|------------------------------|----------------|--------------------------------------|------------------|----------------|
| North America | 3.30% | \$ 79,036 | \$2,608 | 11.6% |
| China | 30.7% | \$60,931 | \$18,675 | 83.4% |
| EMEA | 1.60% | \$50,220 | \$804 | 3.6% |
| APAC (excl. China and Japan) | 1.60% | \$14,429 | \$231 | 1.0% |
| Latin America | 2.7% | \$2,922 | \$79 | 0.4% |
| Total | 10.8% | \$223,950 | \$22,397 | |

Source: GroupM, 2019

Analysing the data by market allows us to see the variations and areas with the greatest risk for the investments made by brands. However, it must be noted that measurement standards are not very well deployed in China, which is why its assessment entails numerous challenges.

Table 2. Fraud involving metrics by market, 2020

| Region | Market | IVT percentage | Digital advertising spend (Millions) | Fraud (Millions) | Share of fraud |
|---------------|-----------|----------------|--------------------------------------|------------------|----------------|
| North America | USA | 3.4% | \$ 73,400 | \$2,496 | 11.1% |
| APAC | China | 30.7% | \$60,931 | \$18,675 | 83.4% |
| APAC | Japan | n/a | \$16,411 | n/a | n/a |
| EMEA | UK | 2.4% | \$14,429 | \$231 | 1.0% |
| EMEA | Germany | 1.6% | 6,338% | 101% | 0.5% |
| APAC | Australia | 1.4% | \$6,216 | 87% | 0.4% |
| North America | Canada | 2% | \$5,636 | \$113 | 0.5% |
| Total | | 10.8% | \$223,950 | \$22,397 | |

Source: Digital Ad Spend: GroupM This Year, Next Year; Average Ad Fraud: DoubleVerify, Integral Ad Science (non-China), RTB Asia, AdMaster, AgBug (China).

The USA, UK and Canadian markets may have higher levels of advertising fraud because there is a higher level of advertising investment, a larger amount of stock is sold using programmatic and there is more of a tradition of using desktops, which are more accessible for bots.

Table 3. Prevalence of fraud involving metrics by channel

| Device | Bot fraud | App or website fraud | Other types of fraud |
|------------|-----------|----------------------|----------------------|
| Desktop | 45% | 7% | 48% |
| Mobile App | 11% | 54% | 35% |
| TV/OTT | 86% | 6% | 8% |

Source: DoubleVerify Global Norms

The different fraud percentages between devices are determined by the technological possibilities. Bot fraud is harder to carry out in environments with closed applications than in connected television, where fraud represents 86%, compared to 45% in computers.

Estimates of the economic impact of advertising fraud vary greatly (different reports give figures between USD 6.5 billion and USD 19 billion), which makes it harder to understand the real impact of the issue. According to estimates made by Statista, financial losses due to doubts about advertising fraud reached USD 5.8 billion in 2019.

The latest data provided in 2021 by Integral Ad Science in its H2 2020 Media Quality Report (2021) showed that in the second quarter of 2020, global fraud rates improved due to the use of campaigns optimised to combat fraud which guaranteed average fraud rates of 1% in all formats. However, these global fraud rates reveal that in campaigns not optimised against fraud, this accounted for 11.9% in 2019 and 8.9% in 2020.

2.2 Different ways of analysing fraud

When analysing advertising fraud, the first step is to look at its different types. Zhu et al. (2017) suggest a taxonomy that differentiates between three main categories: placement fraud, traffic fraud and action fraud. These categories focus on the publisher's websites/pages, network traffic and user actions, respectively. Their work is the most comprehensive publication found in the literature review. They set out the types of fraud, the different approaches, characteristics, methods used to detect it and the tools available to assess it.

Currently, much of the advertising fraud takes place due to so-called invalid (IVT) or non-human traffic, which receives advertising impressions paid by the advertiser, when in reality the impression is not being seen by a real person (Fiosi, Fulgoni and Vollman, 2013). For Fulgoni (2016: 122), IVT is defined as: "Traffic to a website that is generated, intentionally or otherwise, by invalid sources". The author says that there are variations of IVT and that, to eliminate it, these must be identified and measures deployed as the digital ecosystem evolves. He establishes the following types of IVT:

- Traditional bots: systems designed to mimic human users and drive up advertising impressions.
- Adware and browser hijacks: software that makes html or "ad calls" without the user's knowledge. The malware running on the user's device (laptop, tablet, etc.) redirects the user experience to commit the fraud and create fake traffic.
- Ad injectors: programs that maliciously insert advertisements into websites where they do not belong.
- Domain laundering: low-quality sites that impersonate a high-quality publisher to steal advertising sales.
- Data-centre traffic: originating from data-centre devices without human users.

To identify the low-quality impressions related to some types of fraud, professionals and the main verification providers analyse the following indicators (Nicholas, 2020):

- Illegal bots: the most common type of fraud, where machines are programmed to generate impressions not seen by real people. They waste advertising budgets without offering any return.
- Non-viewable ad impressions: according to the definition from the Media Rating Council (MRC) (2014), ads are viewable if they meet the conditions of at least 50% of the ad being viewed for 1 continuous second or more. If the viewable proportion or time conditions are not met, it is considered not to have been viewed. The empirical results obtained by Zhang, Weinan, Ye Pan, Tianxiong and Jun (2015) show that for an accurate measurement it requires 75% of an ad to be viewed for two seconds.
- A violation of ads.txt: the goal is to identify the sale of impressions by resellers and exchanges that do not respect the security guidelines proposed by ads.txt.
- Brand unsafe: provides data on the cost of impressions that have appeared next to content that can harm the brand, following the criteria established by the advertiser in the impression purchasing agreements.
- Spoofed ads: impressions that appear in domains not declared to the Demand Side platform

(DSP), in other words, a site declared as a premium site that ultimately turns out to be a totally different site. This may involve domain spoofing.

- Unverified: the cost of impressions that appear on websites whose quality cannot be verified.

This kind of fraudulent action covers various different legal categories and treatments. Otero and Miralles (2014) performed their analysis from the legal point of view. They classified the different variants by the advertising sales model to identify three basic forms of fraud. For Otero and Miralles: in the CPM model, fraud will consist of falsifying or artificially multiplying the number of specific impressions for an advertisement; in the CPC model, fraud will consist of fraudulently increasing the number of clicks on the advertisement; in the CPA model, the goal will be to reproduce the actions targeted by the advertiser, such as software downloads or linking surfers who perform these actions with a certain advertisement, although in reality the actions are not linked to that advertisement in any way (2014: 72).

Hunting down those responsible for committing fraud is complex due to there being several beneficiaries. First, the media benefit because they increase their income by obtaining better metrics than the real ones. Second, the people who work for the advertiser also benefit, since they earn their bonuses (for example with cookie stuffing, which entails adding illegal cookies to websites without the owner's permission). Third, so do the advertising platforms through their profits and there are even benefits for the advertisers' competitors. It is worth mentioning that the number of participants in the sector who engage in the different types of fraud is constantly declining due to their economic impact. The legal consequences can be of a criminal, civil or administrative nature. Criminal liabilities include common fraud and cyber-fraud. Civil liabilities include compensation for damages. Administrative liabilities include fraud related to cookies and the protection of personal data. Of course, the route chosen to penalise fraud will depend on its severity, the legal right and the party being harmed (Otero and Miralles, 2014).

Many models to detect the different types of fraud have appeared in response to the numerous interests affected by them and the figures they represent. These include the ones proposed by Bourgeois (2017), such as fraud involving metrics on the visibility of impressions, those proposed by Callejo (2016), which suggest a methodology to audit the quality of advertising displays, and the ones by Callejo et al. (2020) which, by using the campaign cost per thousand and the number of impressions per publisher, suggest an approach to monitoring screen impression metrics by incorporating JavaScript code into the advertisement that detects information on fraudulent activities.

Numerous patents have been developed in recent years, such as those by Liu, Nath, Govidan and Liu, (2014), Goldberg, Kim, Morales, Voloshko, Zacharczuk and Cohen (2019) or Clapp and DeFrancesco (2014). Those by Callanan, O'sullivan, Stern, Weir and Willner (2008), Mason (2008) or Merriman and O'Connor (2006) have now been available for over a decade. They are all used, but none has become a universal way to totally prevent fraud.

Special mention must be made of advertising fraud in mobile advertising. Advertising fraud in other devices has been widely studied from several academic fields, but mobile advertising has received less attention. Haider, Iqbal, Rahman and Rahman (2018) suggest a mechanism that lets the different mobile phone servers decide whether an ad visualisation is fraudulent or not.

3. Methodology

The main goal of this study is to look in more detail at fraud involving advertising metrics, examining the role strategically adopted by the main operators in the sector against the different fraudulent behaviours. The sector's lack of clarity about fraud casts doubt on the investments made by advertisers and platforms can only increase trust by using verification and prevention tools that optimise the advertising investments made and build loyalty among advertisers. The specific objectives of this research are:

- Analysing the impact of fraud involving metrics on the quality of the media as an advertisement platform.
- Understanding the opinion of the sector on this issue, as well as its view of the future given programmatic buying.
- Studying solutions to help minimise fraud involving metrics and optimise advertisers' investments.

The main hypothesis for the study establishes that: greater control over fraud involving ad metrics would help attract advertisers, improve the financial returns provided by the digital media and increase advertising efficiency.

The research is underpinned by a comprehensive review of the literature, starting with the recent studies by Dörnyei (2020), Nelson-Field (2020), Nandini (2019), Bashir et al. (2019), Rosen (2015), Wang, Kalra, Borcea y Chen (2017), Wasef (2017), Cluley (2017), Hill, Moakler, Hubbard, Tsemekhman, Provost and Tsemekhman (2015), Flosi, Fulgoni and Vollman (2013), Ghose and Todri (2015), Zhang, Pan, Zhou and Wang (2015), Bounie, Quinn and Morrison (2017) and, especially, Callejo (2016) and Callejo et al. (2020).

After analysing all the main scientific contributions by known authors, the researchers chose to use a qualitative methodology. The reason for this choice is that it is a scientific method that allows for a dynamic approach open to the professional situation and to an explanation of internal processes, the organisation of the patterns of work and the decision-making processes taking place in the professional field and it fits the research goals. Specifically, and through in-depth interviews, the study offers a comparative analysis of the sector data offered by professionals and the fraud prevention strategies such as ads.txt included on the platforms and which are discussed in the interviews performed.

The qualitative information obtained in these interviews was compared with the main data offered by the sector, which, as seen in the state of play, can be very different depending on the interests of each source. The interviews also allow us to identify the different tools used to optimise the management of the indicators that raise the advertising quality of the platforms, as well as opinions on their operation. The objective of including verification technologies has been integrated into management to optimise advertising campaigns and eliminate fraud.

To choose the sample, the decision was made to consult both male and female professionals working in the main agencies, consultancy firms, national media centres and verification technology providers with an average experience of 20 years working in the display advertising industry. A total 32 people were initially chosen and contacted via email to ask them to take part in the research. Of these, 16 responded saying they were interested in taking part in the study.

A semi-structured questionnaire was designed for the in-depth interviews, consisting of 20 questions, with closed-ended and open-ended questions divided into four blocks: analysis of the situation, impact of programmatic purchasing, fraud liability and solutions to reduce fraud. Due to the health emergency caused by Covid-19, the meetings were held online and lasted an average of 52 minutes. They were conducted from the months of September to December of 2020.

Table 4. Profiles of the participating professionals

| Gender | Education | Organisation | Position | Years of experience |
|--------|--------------------------------|---|----------------------------------|---------------------|
| Female | Bachelor's/ Master's Degree | Advertising agency | Former CEO | +20 years |
| Male | Bachelor's Degree | Advertising agency | CEO | +20 years |
| Male | Bachelor's Degree | Advertising agency | Performance strategy director | +15 years |
| Male | Bachelor's Degree | Verification technology providers | Senior account manager | +30 years |
| Male | Bachelor's Degree | Verification technology providers | | +20 years |
| Male | Bachelor's Degree | Analytics tool provider | CEO | +20 years |
| Female | Bachelor's Degree | Digital consultancy firm | CEO | +20 years |
| Male | Bachelor's Degree | Publisher | Director | +30 years |
| Female | PhD | Publisher | Sales Director | +20 years |
| Male | Bachelor's/ Master's Degree | Media centre | Head of innovation | +20 years |

| | | | | |
|--------|--------------------------------|--------------|---|-----------|
| Female | PhD | Media centre | Media director | +20 years |
| Female | Bachelor's/ Master's Degree | Media centre | Digital senior planner | +20 years |
| Female | Bachelor's Degree | Media centre | Audience architecture manager | +20 years |
| Female | PhD | Advertiser | Consumer Insights Manager | +20 years |
| Female | Bachelor's/ Master's Degree | Advertiser | Branding and creativity director | +30 years |
| Female | Bachelor's Degree | Advertiser | Digital and social media corporate communications manager | +25 years |

Source: Own development from the selection of interviewees

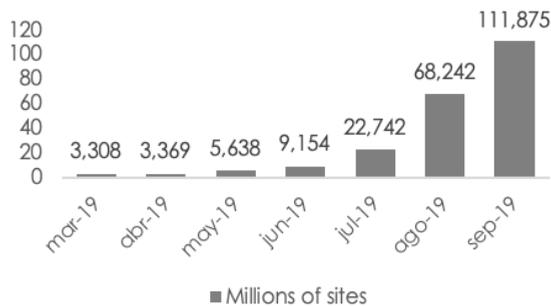
The information obtained in these interviews was analysed and compared to the main data provided by the industry to highlight the results of the analysis of the mechanisms used to address the problem being studied and compare them to other sector data.

4. Results

During the interviews, a clear difficulty was found when addressing the issue of fraud involving metrics. The common initial answer given by the interviewees was a conservative and public view of their trust in the metrics they use to plan campaigns. Once it had been confirmed that the researchers would respect their confidentiality the responses received were richer, they changed from attempting to deny or minimise the issue to giving responses closer to the worst estimates. They all expressed their concern about the issue, especially with the appearance of programmatic buying, which continues to grow in popularity, and the difficulty of creating real lasting solutions due to the technological changes which turn the work of verification companies into a constant battle. Fraud adapts to new markets quicker than verification technology does. Verification companies develop detection algorithms that are far from being robust and sufficient given what is relatively immature advertising technology. They suggest that the development of these verification mechanisms is focussing mainly on the programmatic buying environment.

For now, they all argue for the need to see verification providers being used by advertisers and platforms as an essential strategy. In recent years, the certification of the Trustworthy Accountability Group (TAG), which implements Ads.txt (Authorized Digital Sellers), has been incorporated to assess ads and remove options for fraud. The use of this technology grew by 1,122% in the first quarter of 2019, according to Pixelate (2019). Over half of all programmatic buying applications include it and there is believed to be 63% more invalid traffic in applications that do not incorporate app-ads.txt, as can be seen in the evolution of the adoption of app-ads.txt in Chart 1.

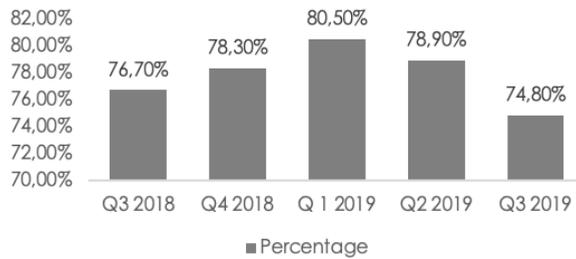
Chart 1. Growth in the adoption of app-ads.txt



Source: Pixelate, 2019

The sites with the most user searches have mostly started using Ads.txt, as can be seen below. Chart 2 shows the percentage of websites adopting this approach.

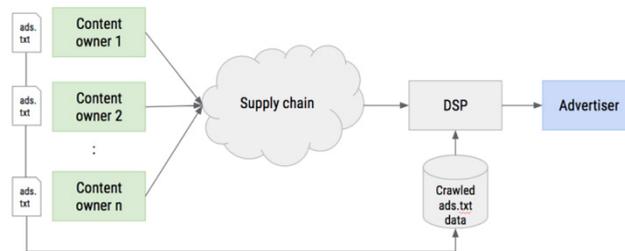
Chart 2. Growth in the adoption of ads.txt in the top 1K sites



Source: Pivalate, 2019

The Ads.txt project is an initiative by IAB Tech Lab in 2017 and has made it possible to increase transparency in programmatic buying. It creates a public record of authorised digital sellers and this increases the quality of the supply chains for inventories and publishers' control over them. This makes it harder to sell counterfeit inventory within the digital ecosystem. For Bashir et al. (2019), the widespread adoption of ads.txt makes it possible to explicitly identify domains that belong to ad exchanges without having to depend on crowdsourcing or heuristic methods.

Figure 1. How Ads.txt works



Source: IAB Tech Labs, 2017

These data correspond to those reported in the interviews, with publishers showing themselves to be particularly aware of its use. However, Ads.txt is still far from achieving its full potential because many platforms have yet to adopt the standard and there are still significant exchanges of advertisements involving the purchase of unauthorised impressions. As platforms gradually adopt Ads.txt, there will be an increase in confidence among brands, which will know that they are purchasing real inventory from a platform. This prevents several types of counterfeit inventory, guaranteeing the advertiser that the URLs have been sold legitimately by the platforms. The following figure shows how El País has adopted this protocol as part of its advertising management and the information on the sale of impressions.

Figure 2. Example of an ads.txt file in El País

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#2021-03-23 PBS ads.txt
appnexus.com, 2579, DIRECT, f5ab79cb980f11d1
quantum-advertising.com, 2316, DIRECT
quantum-advertising.com, 3591, RESELLER
improvedigital.com, 1220, RESELLER
richaudience.com, 1EulXRUH7W, DIRECT
adform.com, 1941, DIRECT
adform.com, 1942, DIRECT
adtech.com, 4687, RESELLER
advertising.com, 7574, DIRECT
aerserv.com, 2750, RESELLER, 2ce496b9f80eb9fa
aol.com, 46658, RESELLER
aol.com, 27093, RESELLER
aolcloud.net, 4687, RESELLER
appnexus.com, 8233, DIRECT
appnexus.com, 2928, DIRECT
contextweb.com, 560520, RESELLER
google.com, pub-4673227357197067, RESELLER, f08c47fec0942fa0
google.com, pub-9115504111147081, RESELLER, f08c47fec0942fa0
indexexchange.com, 179394, RESELLER
lijit.com, 249425, RESELLER
mobfox.com, 74240, RESELLER
mobfox.com, 45499, RESELLER
openx.com, 539625136, RESELLER
pubmatic.com, 81564, DIRECT, 5d62403b186f2ace
pubmatic.com, 156538, DIRECT, 5d62403b186f2ace
rubiconproject.com, 13510, DIRECT
smaato.com, 1100000579, RESELLER
smaato.com, 1100037086, RESELLER
smartadserver.com, 2640, RESELLER
smartadserver.com, 2441, RESELLER
  
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Source: Own development using data from El País updated on 29 April 2021.

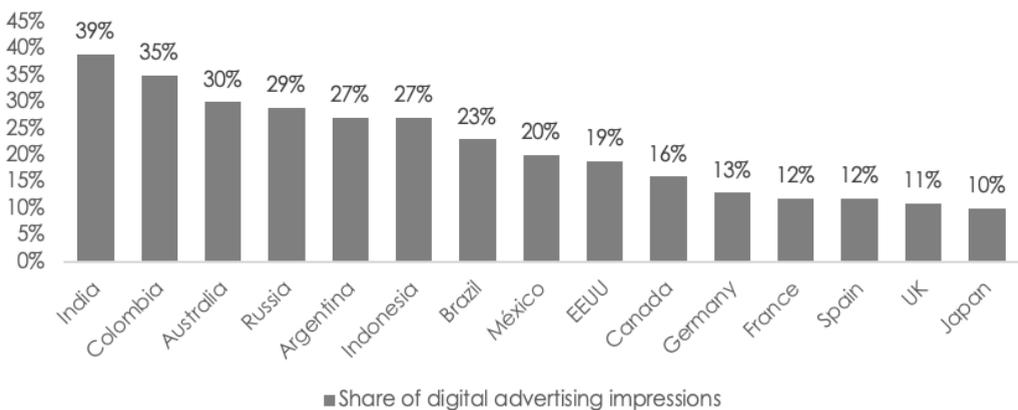
Until now there has been an issue relating to not being aware of the identity of the person responsible for selling impressions, a concern particularly raised by advertisers, advertising agencies, people in charge of analytics and verification companies. This generated the possibility that the URL sent was not an accurate representation of the real impression or of the person who sold it. Impressions already included information on the Open RTB protocol publisher, the website URL and the Publisher.ID, but there was no information confirming the ownership of each Publisher.ID or the validity of the information offered in the RTB bid request. This paved the way for the appearance of counterfeit inventory, which is that coming from a domain, video or application and intentionally labelled incorrectly. In 2017, the company Adform discovered the network called Hyphbot, where over 34,000 fake domain names and URLs had been created that were representing the inventory of publishers such as the "Financial Times", "The Economist", "CNN" and "The Wall Street Journal". Back then, the "Financial Times" admitted that the advertising inventory that faked being under its name appeared in 10 different advertising exchanges and entailed losses of up to USD 1.28 million every day.

We must bear in mind that this only represents part of the problem and the professionals express concern about the various fraudulent behaviours discussed earlier. When talking about counterfeit inventory, we are not taking into account how the traffic is generated, so this issue can be combined with traffic from automated bots and real user traffic. Including Ads.txt protocols is just part of the solution, they say. At the Inspirational Festival organised by IAB Spain, César Alonso, media manager for digital transformation and programmatic marketing for Telefónica, and Giancarlo Giansante, CEO and co-founder of AdJinn, explained how advertisers could also increase transparency in tackling bot farms, sites to buy likes and followers and corrupt ecosystems, offering trust, ethics and reliability.

Another concern voiced during the interviews was the existence of fraud programmed from networks that offer fictional results on an online inventory (with advertisers being particularly sensitive about this point). In pay per click sales models, we can see that much of the data corresponds to fake clicks performed by bots.

When analysing data on programmatic advertising fraud by country, Chart 3 shows that Spain is one of the countries with the lowest probability, at 12%, which is a long way from the 39% figure for India, 35% for Colombia and 30% and 29% for Australia and Russia, respectively, according to Statista with data from 2020.

Chart 3. Programmatic advertising fraud by country 2020



Source: Statista, 2020

The answers obtained suggest that strategies to improve quality and transparency entail addressing four aspects: buying strategies, channels used, tools and equipment allocated and the data used. Transparency within channels can be increased in several ways.

The professionals interviewed who specialised in using verification providers express the need to eliminate fraudulent clicks (forced clicks, click injection and redirection), fraudulent impressions (which are of no real use), pixel stuffing (a 1x1 pixel advertisement in an area of the website that no user sees but which counts as an impression), ad stacking (selling the same advertising format several times by stacking several advertisements on top of each other within a single advertising space) and avoiding cloned websites with fake URLs created to generate traffic and that make it possible to obtain millions in income, as mentioned above.

Given this environment of concern and lack of transparency, as has been detailed, from the statements made in the interviews with advertisers and platforms it seems that the response has been to reduce budgets. In the different sectors interviewed, we see an increase in concern, but solutions are not easy to find. The Programmatic Supply Chain Transparency study (2020) performed by ISBA and PwC and financed by the Association of Online Publishers (AOP), analysed the entire programmatic advertising supply chain. The study is based on previous research by the Federation of Advertisers and the Association of National Advertisers in the USA. It identified each element and set out all of the services and their costs in order to provide a transparent image. In the audit performed by ISBA and PwC on the complexity and opacity of the systems, despite the efforts made, the conclusions were very significant: 50% of the investment in programmatic reached the platforms and 15% of the investment could not be accounted for. The answers obtained mostly expressed the same viewpoint.

The recommendations given by PwC to all participants in the supply of programmatic advertising included providing data in a more streamlined way and improving collaboration. The data are there since all transactions are recorded. However, there is no single system that covers all the information in a reliable way.

Recently, Integral Ad Science and Animo Payments developed the “Total visibility” tool, which may provide a solution to the issue and increase transparency in programmatic buying. This tool allows:

- Verification of the quality of impressions by providing data on fraud detection, visibility and brand security.
- Identification of the cost of impressions and of each part of the purchasing chain used.
- Optimisation of purchases by removing the least efficient pathways, focusing on the ones with the highest quality and the most efficient price.

Figure 3. Cost structure provided by the “Total Visibility” tool

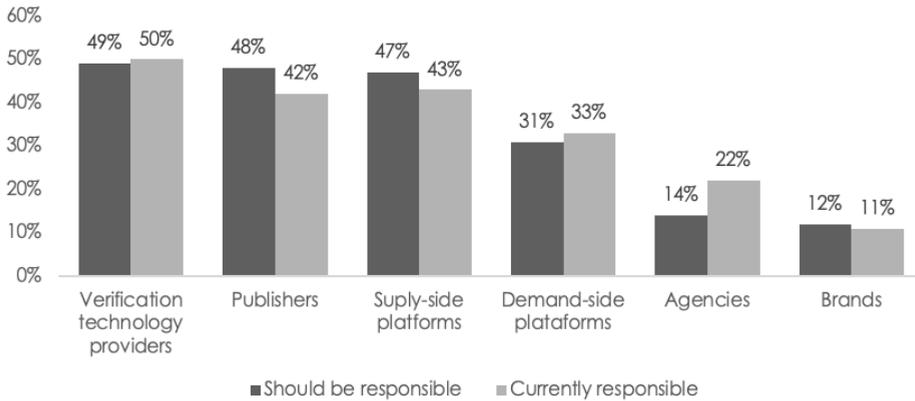


Source: Nicholas, 2020

This tool helps identify the cost and any low-quality impressions, providing data on the indicators seen in section 1.2 of this study. The data contributed by IAS on the programmatic buying working groups that have used this tool show that they saved between 10% and 15% through investments which used to be destined to impressions involving some sort of fraud. John Marshall, digital development director for HP in North America, says that the cost of premium inventory with high visibility has fallen by 60%, and that they can now have real-time data to make strategic decisions, something that was not available to them previously (Nicholas, 2020).

There is shared interest in ending fraud, both in the academic literature and among professionals. For Statista (2019), using the data provided by Integral Ad Science, there are various organisations responsible for limiting this fraud, as can be seen in Chart 4.

Chart 4. Organisations responsible for limiting advertising fraud, according to professionals from the digital media in the United States



Source: Statista with data from Integral Ad Science, 2019

The responsibility for attempting to offer information about the issue that all brands have on their minds, about where their advertising investment is going, belongs to everyone, although advertisers express greater concern.

5. Discussion

After looking in more depth at the phenomenon of fraud involving advertising metrics and its strategic implications for the affected companies, we have observed several main ideas, including the necessary implementation of verification tools and a shared concern about wasted investments and the increase in costs necessary to create higher quality measurements.

The data provided by the sector and the responses given confirm the main hypothesis, since they all suggest that improved control of fraud would attract more investment by providing greater quality and efficiency. Similarly, verification tools make it possible to optimise financial investments in the digital media. However, advertisers and agencies also have doubts about the real capabilities of verification technology.

The theoretic framework reviewed has allowed us to compare the qualitative results from the professionals and adds authenticity to discussions of the issues described by agencies, advertisers and verification providers. In both the review of the different publications and the interviews performed, we can see the complexity of quantifying the issue, and therefore of measuring its reduction. The next step in this research would be to focus on verifying the validity of the results from implementing verification controls provided by companies such as Integral Ad Science (IAS) and Double Verify, to ensure the delivery of advertisements and for brand security. The responses from professionals from agencies and advertisers suggest that the most appropriate choice will depend on the campaign's objectives.

To restore the twin pillars of trust and transparency, the industry has developed third-party verification tools to measure and verify digital spend. In April 2017, YouTube started working with Double Verify and Integral Ad Science (IAS), as well as with other agencies approved by MRC. Other companies such as Facebook and Twitter will also start working with tools such as MOAT Integral Ad Science (IAS). Measurement companies such as Nielsen and ComScore have also done this, with regional networks such as Omnicom Media Group and Choueiri DMS. There are currently several third-party verification tools that measure quality in relation to brand security, visibility and advertising fraud (Double Verify, Double Click Bid Manager, IAS, MOAT, ComScore, Peer39 and WhiteOps).

Another difficulty with solving the problem comes from the proliferation of tools as this can confuse the sector when trying to tackle the issue. This will all depend on the decisions and changes caused by Google's announcement that it will remove third-party cookies and add new management tools.

Future lines of research could look at studying the interests of the media firms in tackling the issue. Our results are in line with the cited research by Dörnyei (2020), which substantiated the little awareness or low expectations about verification technologies. It is a reminder that in public, those involved would rather justify the validity of the metrics instead of recognising the serious nature of the issue. In support of the concern and doubts of the sector, we can offer as an argument the research performed by Callejo et al. (2020), which found that the industry is not efficiently filtering screen fraud.

Lastly, there is another pending subject which particularly concerns experts: the lack of specific legal and much more concrete treatment of these actions.

6. Conclusions

Several types of fraud have emerged from the transformation of the advertising environment in general and specifically the models for selling advertising impressions. Both professionals and academics are responsible for examining this issue in more detail so that the quality and transparency of the media is improved through the use of verification providers. The most important aspects of this study reveal the need to provide answers to these issues to be able to give advertisers clearer information about where their investments are going.

The ecosystem of the advertising media and platforms has become very complex, precisely at a time when the platforms have become fragmented, the crisis of the digital headings model seems to require a diversification of income, the devaluation of the price of impressions continues and technological developments seem to be creating a constant challenge to adapt.

The goal of traditional models has been to obtain the maximum amount of financial income, but technological development raises the possibility of increasing the satisfaction of the various parties and fighting fraud.

The issue of fraud has been exacerbated by the introduction of programmatic buying. Greater knowledge of consumer behaviour and the transformation of that information into data is allowing for the automation of the buying and selling of advertising impressions. According to the experts interviewed, the different types of auctions run represent a new way of planning, but also create the potential for several other types of fraud that are being developed in parallel to the technological possibilities. Verification providers are trying to stay ahead of fraud, but on most occasions, they are simply responding to fraud already committed. This idea is reiterated in their statements. It is important to note that investment in programmatic has slowed down in light of the privacy and inventory supply issues.

A lack of trust and transparency, as well as greater awareness of the scale of fraud taking place, are also influencing this deceleration and the diversification of investment. Globally, the most conservative figures suggest that fraud represents 3.8% of advertising investment. This entailed a spend of USD 591 billion in 2019 being accounted for by invalid traffic (IVT). There is obviously significant variation by region and the lack of deployment of measuring standards in some markets such as China must be considered.

The results of the qualitative methodology offer a conservative vision of trust in the metrics used to plan campaigns with advertisers. However, once confidentiality had been assured, there was an expression of concern about the subject, especially the appearance of programmatic buying and the difficulty of offering real and lasting solutions to the technological developments that turn the work of verification companies into a constant challenge. Responding to the question about where the investment is going can be complicated in an environment where fraud seems to have the upper hand.

Professionals also highlighted the need to implement greater controls through trusted data verification companies. Some argue that there is a lack of responsibility among the interested parties due to low awareness and the convenience of managing things the traditional way. This leads to obstacles to managing fraud detection arising from advertisers having low awareness, a lack of knowledge or limited trust in detection and measuring systems. On this point, the authors of this study sense a fear of the unknown, especially when faced with the complexity involved in understanding systems that involve computer or mathematical skills outside their field of expertise.

There are a range of prevention methodologies. IAB Tech Lab developed the Ads.txt (Authorized Digital Sellers) certificate in 2017 to try to assess advertisements and remove potential ways of committing fraud. It is a public record of authorised digital sellers and increases the quality of the inventory supply chain. It was warmly welcomed by the sector, with growth of 1,122% during the third quarter of 2019 and the use of the protocol in over half the programmatic buying applications, according to data from Pivalate.

Lastly, it is worth noting the emergence of useful tools such as "Total visibility" by Integral Ad Science and Animo Payments that increase transparency in programmatic buying. This system verifies all the necessary indicators for professionals: Illegal bots, non-viewable impressions, violation of the Ads.txt protocol, brand insecurity, ad spoofing and unverified impressions.

Before we finish, it is worth briefly summarising the limitations of this research. First, we should highlight the difficulty in addressing fraud involving metrics arising from the presence of conflicts of interests,

which are a particular issue for professionals in media centres and agencies. The interviewees requested anonymity about their responses and their companies, because of the confidentiality agreements signed by many of them. Second, it is worth noting that it is very difficult to reliably quantify the issue.

In light of the research performed, the working group will continue to study this issue by addressing in greater quantitative depth the media's use of verification providers, advertisers' knowledge of fraud detection options and a comparison of the profits obtained with the various prevention tools.

7. Specific contribution of each author

| Contributions | People responsible |
|---|---|
| Study concept and design | Lidia Maestro-Espínola |
| Documentary research | Lidia Maestro-Espínola David Cordón-Benito Natalia Abuín-Vences |
| Data collection | Lidia Maestro-Espínola |
| Critical analysis and interpretation of the data | Lidia Maestro-Espínola David Cordón-Benito Natalia Abuín-Vences |
| Drafting, formatting, revising and approving versions | Lidia Maestro-Espínola David Cordón-Benito Natalia Abuín-Vences |

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