

**MASTER IN  
MARKETING**

**MASTER'S FINAL WORK  
DISSERTATION**

**THE INFLUENCE OF MOBILE AD FRAUD ON INTERCOMPANY  
RELATIONSHIPS – THE CASE OF HANG MY ADS**

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**OCTOBER – 2018**

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## ABSTRACT

Since its emergence, the mobile advertising industry has been struggling with fraud issues that cause great financial losses and damage how companies relate to one another. The present study takes advantage of the privileged position of the researcher to explore the effects of fraud issues taking place in the mobile advertising industry on intercompany relationships; particularly, it looks at the mobile app advertising ecosystem, the focal context of Hang My Ads and the adaptation processes undertaken by advertisers and publishers to tackle the effects of fraud.

A qualitative case study methodology was used to address the research problem. In addition to the collection of secondary data, semi-structured face-to-face or internet-mediated interviews were made.

The mobile app advertising ecosystem is found to be organized in advertisers, intermediates, publishers and technology companies, and characterized by marking challenges such as fraud, lack of transparency and lack of regulation. Advertisers and publishers seem to adapt in similar ways to one another, but differences are found at the processes of service planning and scheduling, production, and “other” – where advertisers adapt more and seem to invest more resources; and at the level of organization structure – where adaptations appear to be related with company size. Furthermore, the case confirms the occurrence of adaptations taking place in the dyad and propagating to the broader network. In addition to financial losses and poor ROI, the reallocation of budgets according to a publisher’s competence to handle fraud is confirmed; moreover, it is found that damages at the levels of user experience, industry’s reputation and companies’ efficiency are caused by fraud. A visual scheme of the ecosystem’s mapping and a modified framework of analysis are proposed.

**KEYWORDS:** business relationships; adaptation processes; mobile advertising; mobile ad fraud.

## RESUMO

Desde o seu início, a indústria da publicidade *mobile* tem vindo a enfrentar problemas de fraude associados a grandes perdas financeiras e danos na forma como as empresas se relacionam. O presente estudo tira partido do acesso privilegiado da investigadora para explorar os efeitos dos problemas de fraude nas relações entre empresas da indústria; em particular, o estudo aborda o ecossistema da publicidade das aplicações *mobile*, o contexto focal da Hang My Ads e os processos de adaptação levados a cabo por *advertisers* e *publishers* para lidar com os efeitos da fraude.

O problema de investigação foi abordado através de uma metodologia qualitativa de caso de estudo. Além da recolha de dados secundários, foram conduzidas entrevistas semi-estruturadas presenciais ou mediadas por internet.

O ecossistema da publicidade de aplicações *mobile* revela organizar-se em *advertisers*, intermediários, *publishers* e empresas de tecnologia, e é marcado por desafios como a fraude, a falta de transparência e a falta de regulamentação. *Advertisers* e *publishers* parecem adaptar-se de formas semelhantes, embora diferenças sejam detetadas nos processos de planeamento e agendamento do serviço, produção, e “outro” – onde *advertisers* adaptam mais e investem mais recursos; mas também ao nível de estrutura organizacional – onde as adaptações parecem estar relacionadas com a dimensão da empresa. Além disto, a investigação confirma a ocorrência de adaptações ao nível da díade, que se propagam para a rede de empresas mais alargada. Além de perdas financeiras e baixo *ROI*, a realocação de orçamentos de acordo com a competência do *publisher* para lidar com fraude é confirmada; o estudo revela ainda como efeitos da fraude danos aos níveis da experiência do utilizador, da reputação da indústria e da eficiência das empresas. Um esquema visual do mapeamento do ecossistema e um modelo de análise modificado são propostos.

**PALAVRAS-CHAVE:** relacionamentos empresariais; processos de adaptação; publicidade *mobile*; fraude na publicidade *mobile*.

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## GLOSSARY

AFSP – Anti-Fraud Software Partner

APC – Advertiser Partner Company

CPA – Cost-per-action

CPE – Cost-per-engagement

CPI – Cost-per-install

DSP – Demand-side Platform

eCPM – Effective Cost per Mille/ Effective Cost per Thousand Impressions

HMA – Hang My Ads

HMA's COO – Hang My Ads' Chief Operating Officer

HMA's CTO – Hang My Ads' Chief Technology Officer

HMA's AM – Hang My Ads' Advertiser Manager

HMA's PM – Hang My Ads' Publisher Manager

IMP – International Marketing and Purchasing Group

IO – Insertion Order

MAAE – Mobile App Advertising Ecosystem

MMP – Mobile Measurement Partner

PPC – Publisher Partner Company

ROI – Return on Investment

RTB – Real Time Bidding

SDK – Software Development Kit

SSP – Supply-side Platform

VPN – Virtual Private Network

## 1. INTRODUCTION

Research devoted to business relationships has been extensive over the last decades, exploring not only topics concerned with the nature, importance and age of intercompany relationships; but also the factors affecting the development and decay of those relationships; and their effects on the parties involved and the broader horizon of interconnected companies (Håkansson & Snehota, 1995).

Business relationships are based on repeated interactions between companies (e.g. Ford, Gadde, Håkansson and Snehota, 2003; Håkansson and Snehota, 1995; Holmlund, 2004). Such interactions produce mutual orientation and commitment (Håkansson & Snehota, 1995) and provide the knitting of episodes that affect and are affected by the overall relationship, simultaneously revealing conflict and cooperation (Turnbull, Ford, & Cunningham, 1996). The establishment, development and maintenance of relationships with other companies become a complex and central marketing task (Ford, 1980) that is affected by a variety of factors such as past episodes, the present situation, future expectations and the wider network of relationships (Håkansson & Ford, 2002). Moreover, the complex dynamic of a business network reveals that companies cannot remain independent isolated entities, but are, instead, connected with several other companies within a network, be it directly or indirectly (Håkansson & Snehota, 1995; Håkansson & Ford, 2002). Hence, coping with change within the relationship and network emerges as another critical task (Håkansson & Snehota, 1995), since as well as being the means to address problems, interaction and change may be sources of problem generation and conflict between companies (Ford et al., 2008).

Interaction can be understood through the three sub-processes of exchange, adaptation and coordination (Möller & Wilson, 1988), assuming the form of a continuous problem-solving process between companies. Adaptations are held as a necessary condition for the existence of partnerships (Brennan & Turnbull, 1997b) and can emerge incrementally over time (Brennan & Turnbull, 1997), as they stem from the need to coordinate the activities of the individuals and companies, by modifying and adapting products, routines and rules of conduct (Håkansson & Snehota, 1995). In this sense, interfirm adaptations function as elements of social exchange, involving trust-building and power relations (Hallén, Johanson, & Seyed-Mohamed, 1991; Brennan, Turnbull, & Wilson, 2003).

The advertising industry has had swift growth since the emergence and rapid development of the internet. On a global scale, the advertising spending is expected to have escalated beyond

\$628 billion by the end of 2018 (eMarketer, 2018), driven by increased investments in digital and mobile ads. Together, digital and mobile are expected to hold 43.5% of the total advertising investments by the end of 2018 and near 50% by 2020 (eMarketer, 2018). Having achieved unprecedented growth, mobile advertising accounted for 56.7% of digital ad revenues in 2017 (PwC, May 2018), and is forecasted to keep increasing its share to 62% in 2018 (Magna Global, September 2018). Meanwhile, desktop-based ad revenues will keep declining by 3.9% this year. (Magna Global, September 2018).

As mobile advertising escalates, marketers are faced with great challenges. Besides from the many advantages brought by the internet, illegal and unethical behaviors – such as online frauds, thefts, violation of digital property rights and privacy issues – started to arise and create major challenges to the advertising industry (Kim, Jeong, Kim, & So, 2011). The threat of fraud to the advertising ecosystem is a growing concern to both academics and practitioners (Crussell, Stevens, & Chen, 2014; Zhu, Tao, Wu, Cao, Kalish & Kayne, 2017), for it results in reduced return on investment (ROI) for advertisers and an increased portion of wasted advertising budgets (Daswani, Mysen, Rao, Weis, Gharachorloo, Ghosemajumder and The Google Ad Traffic Quality Team, 2008). Yet, very little research has been published on the topic.

The present study aims to deepen the theoretical and empirical knowledge on the influence of mobile ad fraud in intercompany relations. The research takes as theoretical delimitation the study of business relationships with a specific focus on their inherent adaptation processes since these consist of the core processes through which not only companies respond to environmental and market forces, but also establish long-term relationships with other companies. On the other hand, taking advantage of the privileged access to data by the researcher, the study assumes as practical limitations: the focus on the mobile app advertising ecosystem – a subsector of the broader mobile advertising industry, which for the scope of this study is considered as the ecosystem of companies related to either demand or supply of in-app and/ or app advertising; the issue of mobile ad fraud; and the focal network of Hang My Ads (HMA) – a mobile advertising company focused on app promotion.

The overall purpose of the research is to understand how fraud in the mobile advertising industry affects intercompany relationships, from which the following research problem emerges: how do fraud issues in the mobile advertising industry affect the relationships between advertisers and publishers? Four research questions are selected: RQ1) Who are the different players within the mobile app advertising ecosystem and how can the relationships between them be mapped? RQ2) How do fraud issues affect the adaptation processes undertaken by

publishers (suppliers)? RQ3) How do fraud issues affect the adaptation processes undertaken by advertisers (clients)? RQ4) What are the main effects of fraud within the mobile app advertising ecosystem?

The relevance of combining the study of business relationships and adaptation processes with the mobile app advertising ecosystem (MAAE) and the phenomenon of mobile ad fraud relates to the lack of academic and sometimes managerial knowledge on the topic: whilst many researchers have dedicated studies to the comprehension of fraudulent activities within online advertising, very little has been written about those involved or the impact their activities have on advertiser-publisher relationships. As Grewal, Bart, Spann and Zubcsek (2016) note, marketing research must continue to push the boundaries of mobile advertising research, by collaborating closely with practitioners for a greater access to relevant data. By taking advantage of the professional position of the researcher, the opportunity to fill the theoretical and empirical gap presented and simultaneously provides a positive and original contribution to the academic community becomes exciting and, hopefully, more feasible.

The study presented is outlined as follows: we first review prior research on the topics of business relationships and networks, adaptation processes, and mobile advertising and fraud; the next section presents the conceptual framework that guides the research; considerations of method are next described; further ahead, the case study and its analysis are presented; finally, the closing chapter highlights the major conclusions, implications for management and recommendations for future research arising from the research.

## 2. LITERATURE REVIEW

In the course of this literature review, a brief outline of prior research is carried out with regards to the major topics and concepts underlying the research. The approach to business relationships and networks includes a discussion on how business relationships develop and how interdependence between them forms business networks; research on dyadic adaptation processes, its classification and its measurement models is further presented. Lastly, literature on mobile advertising and fraud in the online advertising industry is discussed.

### *2.1. Business relationships and networks*

#### *2.1.1. Development of business relationships*

Some of the pioneer contributions to the research on business relationships have had their origin within the International Marketing and Purchasing (IMP) Group, but a number of other

contributors have also helped to shape the theoretical and empirical knowledge on business-to-business marketing and the nature of buyer-seller relationships within business markets (Turnbull et al., 1996). Yet, as Fonfara, Ratajczak-Mrozek and Leszczyński (2016) note, the IMP Group's research stood out because of its search for explaining empirically observed phenomena, while challenging old economic thinking's concepts and ideas and suggesting alternative frameworks.

Although the extant literature on the subject reveals slight differences between definitions of business relationships, a common assumption that these are based on repeated interactions between the counterparts involved is evident (Holmlund, 2004). Håkansson and Snehota (1995) adopt a relationship view of business markets, focusing on intercompany relationships over time, instead of singular transactions and exchange episodes, as this seems to offer a more pragmatic description of the problems faced by companies. The authors take on the definition of relationship as a "mutually oriented interaction between two reciprocally committed parties" (Håkansson & Snehota, 1995, p. 25) and apply it to the intercompany context in industrial markets to further define it as "a result of an interaction process where connections have been developed between two parties that produce a mutual orientation and commitment" (Håkansson & Snehota, 1995, p. 26). Similarly, Ford et al. (2003, p. 38) define a business relationship as the "pattern of interactions and the mutual conditioning of behaviors over time, between a company and a customer, a supplier or another organization". For Turnbull et al. (1996, p. 45) the relationship works as a "receptacle for the combined experience of the participants", consisting of learned rules and norms of behavior and providing the atmosphere of episodes that affect and are affected by the overall relationship, simultaneously revealing conflict and cooperation.

The concept of time emerges as a defining feature of business relationships and the chain of interactions and episodes that shape them (Ford, 1980; Ford et al., 2003; Håkansson & Snehota, 1995; Holmlund, 2004). By focusing on episodes taking place between companies over time, the authors adopt a relationship view as opposed to single exchange episodes (Ford et al., 2003) and capture the past and future of interdependencies (Håkansson & Snehota, 1995), behaviors, experiences, expectations and commitments within the relationship (Ford et al., 2003). Seen as sequences of acts and counteracts, business relationships become simultaneously mutually demanding and mutually rewarding (Håkansson & Snehota, 1995).

The complex structure and dynamics of business markets imply that companies foster the establishment, development, and maintenance of relationships with other companies as a central

marketing task (Ford, 1980). Håkansson and Ford (2002), when studying actor's reactions, identify five factors that impact on relationship development: 1) previous acts taking place within the relationship; 2) previous learnings from other relationships; 3) the current state of the relationship and connected relationships; 4) expectations of the parties regarding the future of the relationship; and 5) what is happening in the wider network of relationships.

### 2.1.2. *Interdependence and networks*

Exploiting the full potential of a supplier-customer relationship requires a close integration of both companies' operations and, therefore, extensive interpersonal interaction, coordination of activities and adaptation of resources become necessary (Gadde & Snehota, 2000).

One of the core assumptions of the IMP Group's research is the interdependency between business relationships, meaning that exchange in one relationship necessarily conditions exchange in others and therefore one company cannot be fully autonomous (Ford et al., 2003; Gadde & Snehota, 2000; Håkansson & Snehota, 1995). Each relationship entails interdependencies between the parties involved, and at the same time reveals interdependencies with several other relationships, forming a network (Gadde & Snehota, 2000). The adoption of a network approach implies that business relationships are seen as forming part of a wider structure, instead of being isolated entities (Ford et al., 2003; Håkansson & Snehota, 1995; Möller & Halinen, 1999). Such vision offers a richer picture of the constraints and opportunities a company faces when dealing with its suppliers and clients (Håkansson & Snehota, 1995) and emphasizes all the related interactions that take place in the network between a multitude of connected parties (Backhaus & Büschken, 1997).

The concept of business network takes shape as an organization without a clear center or clear boundaries that implies a chain effect resulting from connectedness, meaning that whatever happens in one business relationship propagates and affects the whole network. Consequently, any relationship between two companies cannot depend solely on the parties involved: a change in one relationship affects the state of some other relationship(s), be it positively or negatively; and any attempt of developing new relationships depends on the broader network structure (Håkansson & Snehota, 1995; Håkansson & Ford, 2002; Möller & Halinen, 1999). In this sense, business networks can be regarded as patterns of complex interactions within and between companies, taking place over time and incurring in both benefits and costs for the parties involved (Ford et al., 2003; Håkansson & Ford, 2002). Such

interactions, along with adaptations and investments over time, dictate how dense the network is and how it is economically, technically and socially structured (Håkansson & Ford, 2002).

## *2.2. Adaptation processes*

The IMP's interaction approach has largely contributed to the research on business relationships (Backhaus & Büschken, 1997; Biggemann & Buttle, 2007; Håkansson, 1982; Håkansson & Ford, 2002; Holmlund, 2004; Medlin, 2004; Möller & Wilson, 1988; Turnbull et al., 1996), by placing the analytical concept of interaction at the heart of the relationship and network (Medlin, 2004).

Interfirm interaction can be understood through the three sub-processes of exchange, adaptation, and coordination. Together, interaction processes shape the way relationships develop, are maintained and are terminated (Möller & Wilson, 1988). Interaction is a process in which ideas, solutions, technologies, problems, and interdependencies are dealt with and transferred across a network of companies, each taking advantage of the benefits, continuous change and cooperation involved, therefore working as both a dynamic and a stabilizing force (Ford et al., 2008). Additionally, interaction may take place as a routine, without conscious effort or planning, or may, in contrast, require extensive planning, development, negotiation, bargaining or conflict; the typical scenario is that interaction assumes the role of a more or less continuous problem-solving process between the parties and each dyadic interaction is affected to a greater or lesser extent by those with which it is connected (Ford et al., 2008).

Within interaction processes, adaptation processes have deserved greatest prominence in research (e.g. Brennan & Turnbull, 1997, 1997b, 1999; Brennan et al., 2003; Fonfara et al., 2016; Ford, 1980; Hallén et al., 1991; Schmidt, Tyler, & Brennan, 2007), since “adaptation, by one or both partners, is a necessary condition for the existence of a “relationship” or “partnership”” and “the ability of the firm to respond to environmental or market forces is a critical factor for survival and success” (Brennan & Turnbull, 1997b, p. 128).

Adaptation processes represent “the extent to which the buyer and seller make substantial investments in the relationship” (Metcalf, Frear & Krishnan, 1992, p. 29, as cited in Baptista, 2013) and stem from the need to coordinate the activities of individuals and companies, by modifying and adapting products, routines and rules of conduct, so to reflect a mutual commitment that both constrains and empowers companies (Håkansson & Snehota, 1995).

Ford et al. (2003) argue that adaptations are the means by which a company shows it can be trusted to respond to a counterpart's requirements and that the willingness to adapt reveals

the company's commitment to the development of the relationship. Interfirm adaptations are hypothesized by Hallén et al. (1991) as elements of a social exchange process, involving trust-building and power relations. The same component of trust-building in mutual adaptations is emphasized by Brennan et al. (2003), who, supporting the findings of Hallén et al. (1991), distinguish between reciprocal and unilateral adaptations: while the former corresponds to a means of trust building, the latter emerges in research as a response to power imbalances (Brennan et al., 2003; Hallén et al., 1991). Adaptations often lead to the emergence of relationship-specific assets and thus have to be managed and controlled, in order to avoid uncontrolled investments (Ford, 1980).

Schmidt et al. (2007) findings reveal that there is no difference between supplier and customer companies in terms of motivations to adapt, although suppliers refer to a wider variety of reasons to adapt. The authors justify the finding with the fact that – as other researchers have argued – suppliers adapt more than customers (Baptista, 2013; Brennan et al., 2003; Schmidt et al., 2007). The authors also find that suppliers are much more likely to adapt in large scale and that large-scale adaptations are a rarity in customer companies (Schmidt et al., 2007). Finally, their study suggests that while product or production process adaptations are more commonly motivated by direct operational needs, human resources and organization structure adaptations are usually driven by the need of building trust and commitment (Schmidt et al., 2007).

### *2.2.1. Definition of dyadic adaptations*

Early research points out to the importance of adaptations, by highlighting examples and offering analogies (e.g. Håkansson, 1982; Hallén et al., 1991), without, however, providing a succinct definition of the concept. Brennan, Turnbull and Wilson (2003, p. 1939) call this lack of consensus problematic and suggest a definition wide enough to comprise changes by both parties and a broad range of activities: “dyadic adaptations are defined as behavioral or organizational modifications at the individual, group or corporate level, carried out by one organization, which are designed to meet the specific needs of one other organization”. The term dyadic adaptation places the focus at the level of the supplier-customer relationship, as opposed to some approaches to strategic marketing that emphasize the macro-environment (“environmental adaptation”) and the market level (“market adaptation”). Dyadic adaptations can be unilateral (when a firm implements a non-reciprocal specific modification for an exchange partner) or mutual (when reciprocal adaptation takes place to facilitate the exchange process) (Brennan et al., 2003).

Dyadic relationships are influenced by relationships with other companies (Anderson et al., 1994) and thus adaptations and changes cannot be attributed solely to the dyad: because companies are socially constructed through the interaction of people within the company and with other companies, network effects can potentially be observed within dyadic interaction, since its actors construct meaning with reference to contexts beyond the dyad (Biggemann & Buttle, 2007). Halinen et al. (1999) come to similar findings by stressing the possibility of connected and disconnected changes within a business relationship dyad. The authors suggest that part of the change always remains within a dyad (confined change), whereas some part of it may also have effects in the extended network of relationships (connected change). Hence, the dyad not only “generates change by itself, but also functions as a recipient and a transmitter of change with respect to other relationships in the network” (Halinen et al., 1999, p. 784).

### 2.2.2. *Classification and measurement of dyadic adaptations*

Several classification and measurement schemes for dyadic adaptations have been proposed by researchers in prior literature and are reviewed by Brennan et al. (2003). Håkansson (1982) establishes a classification scheme that entails both suppliers and customers divided by: product specification, product design, manufacturing processes, planning, delivery procedures, stockholding, administrative procedures, and financial procedures. Turnbull and Valla (1986) and Hallén et al. (1991) distinguish between customer and supplier adaptations, comprising: product, manufacturing process, payment terms, production, planning, delivery, and stocks. Other studies view adaptations unilaterally (e.g. Holmlund and Kock, 1995, as cited in Brennan et al., 2003; Cannon, Achrol and Gundlach, 2000, as cited in Brennan et al., 2003).

Brennan et al. (2003) further builds on Håkansson (1982) and suggests the addition of two other categories to his classification, namely, information provision and organization structure. The authors defend that such addition improves the classification of adaptation outcomes and state that no evidence emerged from prior literature to support the differentiation between customer adaptations and supplier adaptations, and, for that reason, “a single classification system could be equally well applied to adaptations implemented by supplier and customer organizations” (Brennan et al., 2003, p. 1640). Adaptations are therefore classified in terms of: production planning and scheduling, stockholding and delivery, product, information exchange, production process, financial or contractual terms and conditions, organization structure, and other adaptations (Brennan et al., 2003, p. 1641). Schmidt et al. (2007) claim to have found a more diverse scheme and state that besides from adaptations of products, production processes and logistics explored by the previous research, organizational and behavioral adaptations must

be taken into consideration as well (e.g. financial and contractual terms/conditions, organization structure, and personnel).

As Brennan et al. (2003) note, the tendency for evaluation of dyadic adaptations lays at the self, i.e. individuals tend to emphasize adaptations made by their company instead of adaptations made by their counterparts. Because the measurement of adaptation is affected by individual perceptions, straightforward unilateral measurement instruments are problematic and, ideally, data should be gathered from both ends of the dyad and from more than one respondent in each organization, so to obtain deeper consistency (Brennan et al., 2003). A similar finding can be drawn from the study by Corsaro and Snehota (2012, p. 279) who state that “behaviors in interaction cannot be effectively explained by what the individual party knows and intends to do; rather, (...) we need to look closely at joint behaviors and how they mutually condition the parties to the relationship”.

### *2.3. Mobile advertising and fraud*

#### *2.3.1. Mobile advertising*

The concept of mobile advertising hasn't yet been attributed a common definition. The American Marketing Association (2018) does not provide any definition for mobile advertising nor for mobile marketing. The Mobile Marketing Association (2009) defines mobile marketing as the “set of practices that enables organizations to communicate and engage with their audience in an interactive and relevant manner through and with any mobile device or network” and mobile advertising as “a form of advertising that is communicated to the consumer/ target via a handset (...), most commonly seen as Mobile Web Banner (top of page), Mobile Web Poster (bottom of page banner), and full screen interstitial.” (Mobile Marketing Association, 2018). Leppäniemi, Karjaluoto and Salo (2004, p. 93) suggest that mobile advertising can be defined as “any paid message communicated by mobile media with the intent to influence the attitudes, intentions and behavior of those addressed by the commercial messages” through mobile devices.

The personal nature of mobile devices along with the ability to track context-dependent information (such as time and location) provides advertising with new opportunities (Barnes, 2002). Some research has focused on developing mobile advertising specific frameworks and on exploring the industry's potential and implications (Barnes, 2002; Bulander, Decker, Schiefer, & Kölmel, 2005; Fanjiang & Wang, 2017; Grewal et al., 2016; Hu, Shin, & Tang, 2010; Leppäniemi et al., 2004; Park, Shenoy, & Salvendy, 2008).

Barnes (2002) reviews the emerging technologies, applications and research issues inherent to wireless advertising, highlighting the personal, interactive and ubiquitous nature of devices as well as their measurability and traceability potentials. The author further highlights the opportunity of deepening customer relationships by providing services in a productive and context-relevant manner, stating that the convergence between marketing, CRM and mobile commerce represents a mighty platform for advertisers. Leppäniemi et al. (2004), on their model of mobile advertising value chain, identify five critical factors for the value chain creation: content, cross-media marketing, campaign management, customer database, and carrier cooperation; and identify as the key players in value chain: the advertisers, the advertising companies, the media owners, the traditional advertising agencies, the network operators/carriers, the technology providers, and the customers.

Park et al. (2008) propose a framework for advertising through mobile phones, according to three groups of factors: advertisement design, audience, and environment. Similarly, Grewal et al. (2016) develop a mobile advertising effectiveness framework and organize it under seven components: role of context, consumer-related contextual variables, role of advertising goals, relevant outcome metrics, role of advertising elements, market factors, and firm-level macro factors. The authors consider the nature of the industry, market differences, the variety of devices and carriers, partnerships, government and industry regulations, and privacy concerns as crucial forces that may restrain or enable the effectiveness of mobile advertising. Moreover, they note the fragmentation on exchange systems and pricing schemes practiced.

Bulander et al. (2005), in turn, list the main features and challenges of the mobile business (e.g. high penetration rate of mobile terminals, multimedia capabilities, interactivity, spam, limited user interface, privacy concerns) and stress a core conflict related to the fact that personalized advertising requires sensitive information from the user, which brings to light tremendous privacy concerns. They further propose a system for mobile advertising that considers and balances both ends of the paradigm. The framework proposed by Fanjiang and Wang (2017) also aims to solve the problems inherent to mobile ads, suggesting that by using context rules, users may be able to filter advertising they're not interested in, therefore reducing spam and increasing the effectiveness of the advertising effort.

Despite the increasing popularity of mobile in-app advertising, very few studies have explored the subject. The existent research mainly focuses on security and privacy concerns and issues (e.g. Kim et al., 2011), but some other topics related to in-app advertising have started to arouse curiosity among academics.

Mobile apps can be monetized either through in-app purchases or through in-app advertising (Lee & Shin, 2017). Advertisement is a primary business model encouraging app developers to distribute their apps for free (Crussel et al., 2014; Cho, Cho, Song, Choi, & Kim, 2016), in which ad libraries embedded in the app fetch ad content to display to the user using the app's interface (Crussel et al., 2014). However, as Chen, Ji and Copeland (2016) point out, a number of criticisms underlie in-app advertising practices: users must passively receive ads while using apps; users get nothing from viewing and clicking ads; ad networks may collect user's private information without user's consent; and irrelevant ads may cause negative impressions and harm the advertised brands.

Chen et al. (2016) present the "In-App AdPay" framework that aims to combine the advantages of in-app advertising and in-app billing together so that ad networks can request users' permissions and serve more tailored ads; in return, advertisers must pay targeted users' virtual transactions (e.g. coins or points). In this sense, the authors place the users in the monetization loop in order to balance both user's privacy and experience while securing the conditions for the existing monetization strategies. Lee and Shin (2017), for example, contribute to the body of literature about the effectiveness of mobile advertising by approaching the effects of in-app rewarding on subsequent in-app purchases (applied to the mobile gaming context) and discover that in-app rewarding plays a boosting role on subsequent in-app purchases.

### 2.3.2. *Fraud in the online advertising industry*

Kim et al. (2011) study the emergence of a negative stream of practices associated with the new internet technologies to which they call "the dark side of the internet" (e.g. spam, malware, hacking, phishing, attacks, invasion of privacy, frauds, violation of digital property rights, etc.) and to which they provide taxonomies of the causes, costs and possible responses. The authors believe that the nature of the internet works as a major facilitator of the dark side behaviors, not only due to the easiness of anonymity, but also due to the availability of highly valuable but free resources and services, and identify the reasons behind such behaviors, such as psychological factors and the desire for financial gains – this last one serving as a major reason for online and ad frauds (Mungamuru & Weis, 2008; Kim et al., 2011)

The threat of fraud to the advertising business model and ecosystem is a growing concern to both academics and practitioners (Crussel et al., 2014; Zhu et al., 2017), since it results in reduced ROI for advertisers and an increased portion of wasted advertising budgets (Daswani et al., 2008). Existent studies range from the implications of ad fraud, to the technical challenge

of its detection, and the presentation of solutions for its prevention. However, research is mostly focused on the context of desktop advertising and on the so-called click fraud. Consequently, mobile advertising fraud has been largely unstudied so far (Crussel et al., 2014; Zhu et al., 2017) and many studies fail to approach other types of ad fraud.

Overall, three major revenue models are commonly used in online ad systems: cost per mile (CPM), when the advertiser is charged per thousand impressions delivered; cost per click (CPC), when the advertiser is charged per click; and cost per action (CPA), when the advertiser is charged per completion of a predetermined action (e.g. an app install, a purchase, a subscription) (Daswani et al., 2008; Zhu et al., 2017). Performance-based advertising is a particularly significant and attractive method because it allows to track the effectiveness of campaigns, as the user actually performs an action beyond clicking the ad (Daswani et al., 2008; Cho et al., 2016). Despite this, Shankar and Hollinger (2007) point out to the fact that CPA-based advertising itself cannot measure ROI of future purchases based simply on a single ad exposure and claim that companies cannot make the mistake of basing their metrics on transactions instead of customers.

Put in the simplest form, ad fraud can be differentiated into human and robotic attacks (Daswani et al., 2008). The taxonomy suggested by Zhu et al. (2017) classifies ad fraud into three major types: ad placements, whose main goal is to manipulate the publisher media space or content so to increase the number of impressions or clicks; ad traffic, whose intent is to generate fake traffic and inflate the number of impressions or clicks generated from individual sites or placements; and ad user actions, whose strategy is to target user's actions and generate revenue. In their taxonomy, impression and click fraud are categorized under the umbrella of traffic fraud, while conversion and re-targeting fraud are put under the specter of action fraud.

Different approaches may be used in each fraud behavior. Fake clicks may be generated either by click farms (when cheap human labor is hired to manually click on ads) or by click bots (when automated computer systems generate click events that resemble genuine human users) (Daswani et al., 2008; Kim et al., 2011; Zhu et al., 2017). Similarly, conversion fraud may come from lead farms (when people from under-developed countries are hired to produce fake conversions) or by lead bots (when a computer agent automatically fills out lead forms, for example, with randomly generated or partially correct data) (Zhu et al., 2017). On the other hand, re-targeting fraud is usually achieved exclusively with the use of computer-generated agents that mimic human's intentions and behaviors, deceiving advertisers into the belief that traffic is coming from valuable potential customers (Zhu et al., 2017).

Specific research on fraud and mobile apps is still very limited. Crussel et al. (2014) identify two fraudulent behaviors in in-app advertising: requesting ads while the app is on the background; and clicking on ads without user interaction. The authors build on the two behaviors described and develop “MadFraud”, an analysis tool that allows running several Android apps simultaneously in emulators, triggering and exposing ad fraud. They find that 30% of apps with ads make ad requests while running on the background of a user’s device; in addition, they identify twenty-seven apps from their dataset that generate clicks without user interaction. Cho et al. (2016) extend the previous work by implementing independent bot programs that automatically generate fraudulent click events. The authors target eight advertising networks and find out that artificially generated click events are successfully approved by six of them, which means they were not able to detect such anomalous click attempts. They further propose an advertising system that mitigates click generation software, an approach they call “honey advertisement” (Cho et al., 2016).

Another stream of research has been looking into the impact of fraud in the advertising ecosystem. Mungamuru and Weis (2008) propose an economic model of the online advertising market focused on the effect of ad fraud, its economic incentives and associated behaviors. The model comprises three groups of players – publishers, advertising networks, and advertisers – and the central question is whether ad networks have incentives to proactively combat fraud. The authors find that ad networks can differ in their ability to filter ad fraud and conclude that letting fraud go unchecked is suboptimal and that ad networks can gain competitive advantage by aggressively fighting fraud. Daswani et al. (2008) also defends that ad networks have strong economic incentives to minimize fraud, as they need to provide advertisers with a better ROI in the hope to see their long-term spending increased; besides, by offering lower fraud rates and a better ROI, ad networks gain the trust of advertisers and leverage their competitive advantage, ultimately increasing their own ROI. In this way, “more efficiently delivering relevant ads to legitimate users will benefit all parties in the system – except the fraudsters” (Daswani et al., 2008, p. 18). Jain, Midha and Animesh (2010), in a study focusing on sponsored search, suggest that advertisers are likely to adjust their budget allocation decisions according to their level of trust in the intermediary’s technical competence to detect and report fraud. On the other hand, Cho et al. (2016) write about economic disincentives and claim that many ad networks might rather profit from fraud than from defenses to mitigate such attacks.

3. FRAME OF REFERENCE

Considering the overall purpose of this study and building on the literature review presented, a conceptual model to guide the research that will follow is proposed below in Figure 1. The model builds upon concepts and frameworks of adaptation processes, mobile advertising and digital advertising fraud and is mainly supported by the models and findings of Brennan et al. (2003), Daswani et al. (2008), Mungamuru and Weis (2008), Jain et al. (2010), Grewal et al. (2016) and Zhu et al. (2017) and is organized in three sets of dimensions: MAAE, mobile fraud issues, and impact of fraud on the MAAE.

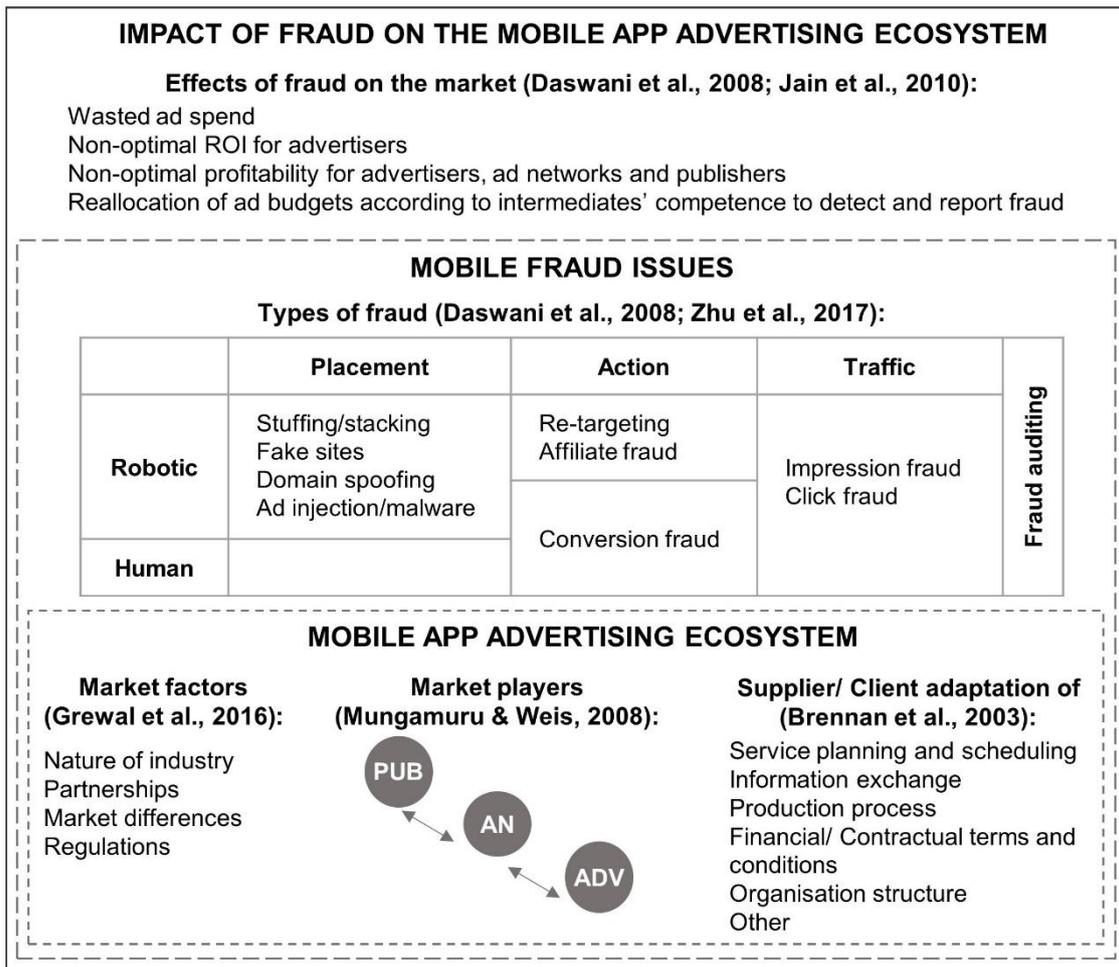


Figure 1: Conceptual framework.

In order to pursue RQ1's goal and identify the different players forming the MAAE and understand the context of the relationships linking them, two studies are selected at the outset. The study by Grewal et al. (2016) becomes relevant because it characterizes the market factors that serve as context for the companies operating in the mobile advertising industry. The study

by Mungamuru and Weis (2008) outlines the major players in the industry: advertisers, advertising networks and publishers.

To tackle RQ2 and RQ3 and approach how fraud issues impact on the needs to adapt by both publishers and advertisers, three studies are selected. The study by Daswani et al. (2008) divides digital ad fraud into human and robotic attacks and further suggests the need to pursue a fraud auditing by the advertising companies. On the other hand, the study by Zhu et al. (2017) presents a taxonomy of ad fraud divided by placement fraud types, traffic fraud types and action fraud types. Lastly, Brennan et al. (2003) conduct a comprehensive review of adaptation processes' models and suggest the addition of two complementary variables to the seminal model by Håkansson (1982).

Finally, to grasp RQ4 and identify the main consequences and effects that fraud poses to the industry, two studies are selected. Daswani et al. (2008) conclude that fraud is one of the main reasons behind the waste of advertising spending, and a cause for unsatisfactory advertising ROIs and low profitability levels for all players – advertisers, ad networks and publishers. Jain et al. (2010), in turn, point out to a reallocation of advertising budgets according to how capable of preventing fraud an advertising company believes a publishing company is.

#### 4. METHODOLOGY

The method chapter presents the arguments that led to choose the methodological approach; the type of sampling, data collection techniques and analytical procedures used; and lastly, the major data quality and methodological constraints to consider.

##### *4.1. Methodological approach*

The research was guided by an interpretivist philosophy, informed by a constructivist epistemology (Crotty, 1998). This choice of philosophy is argued to be highly suited in the research of complex business settings, for it allows to capture unique contexts, sets of circumstances and interactions between individuals: the researcher enters the social world of the participants to understand it from their point of view (Saunders et al., 2015), making sense and interpreting the meanings with reference to his own values and beliefs (Creswell, 2009). Researcher and research object are thus interactively bounded, and constructions are “elicited and refined only through interaction between and among investigator and respondents” (Guba & Lincoln, 1994, p. 111).

A mainly deductive approach was adopted since a pre-established framework guided the collection of data and the analysis that followed. A descripto-explanatory purpose with a multimethod qualitative orientation were chosen to support the case study methodology (Saunders et al., 2015). As defined by Yin (2014, p. 16), a case study is “an empirical inquiry that investigates a contemporary phenomenon (the “case”) in depth and within its real-world context, especially when the boundaries between phenomenon and context may not be clearly evident”. The cross-sectional study adopted a single case embedded design supported by a revelatory case rationale (Yin, 2014) since the topic under study was largely inaccessible to scientific research, and thus advantage was taken from both the privilege of access and the preunderstanding of the context by the researcher.

#### *4.2. Sampling and data collection techniques*

The research used a non-probability purposive sampling (Saunders et al., 2015). The focal network of Hang My Ads was selected, both because of access facilitation, and because it allowed to collect data from both ends of the advertiser-publisher dyad.

Hang My Ads is a mobile ad network based in Lisbon, Portugal, and established in 2014. The company focuses on mobile app promotion, by targeting apps to the most suited audiences on iOS and Android devices, through a multitude of premium apps, websites, and its own offer wall product, on a worldwide basis (although TIER 1 and a few countries from TIER 2 represent the majority of their inventory). The company’s mission is to “help our advertisers target, acquire and engage users across the mobile world, through a wide variety of traffic sources” and to “build solutions to better serve app developers on every stage, whether they’re launching [the app], making it grow, looking to engage their users or just monetize non-paying users by serving our ads” (Hang My Ads, 2018). HMA promotes apps on both incentivized and non-incentivized traffic, on CPI/CPA/CPE performance models and through several ad formats.

The APC interviewed is a London, UK, based company, operating since 2012. The company holds as core business an incentivized offer wall (mobile and desktop platforms) but is able to serve its clients and publishers with an ad network as well. Although mostly focused on incentivized traffic, APC promotes non-incentivized ads as well, on both Android, iOS and desktop platforms, through CPI/CPA/CPE performance models and using advanced machine learning processes to target and optimize traffic.

The PPC interviewed operates within the digital advertising industry since 2000, being headquartered in Minnesota, USA, with offices spread globally in conjunction with its parent

company headquartered in Guangzhou, China. PPC is a mobile performance solution with an ad network as core business, focused exclusively on non-incentivized traffic, but serving ads through diverse formats and performance models, for both Android and iOS devices.

AFSP is a Berlin, Germany, based company, operating since 2013. AFSP offers an affiliate fraud detection tool based on machine learning technology and data algorithms, providing advertisers with a transparent tool to reveal and reject complex fraud patterns found in advertising.

Data collection comprised both secondary and primary data. Secondary data collection consisted of gathering documentary and survey-based materials from online sources, including internal reports from the focal firm's database and published industry materials and news. This set of secondary data proved to be useful in the understanding of the phenomenon to study and how it develops; in the preparation of the interviews; and, lastly, as a useful source to compare primary data against.

On the other hand, primary data collection used interviews in two fronts: an initial unstructured interview aimed at exploring in depth the topic of ad fraud in the MAAE, its underlying issues, and the challenges they represent for the parties involved and the broader business ecosystem; a second phase consisted of audio recorded semi-structured interviews that further explored the topic and dimensions in analysis from a more formal stand and from the different perspectives and interpretations of each interviewee. While the first interview captured the insights of only HMA's co-founder and COO, the second stage interviews were split into face-to-face and internet-mediated interviews and included: both HMA co-founders – respectively, the COO and the CTO (hereinafter referred to as HMA's COO and HMA's CTO, respectively); one HMA advertiser manager representative (HMA's AM); one HMA publisher manager representative (HMA's PM); one advertiser partner (APC); one publisher partner (PPC); and the managing director of HMA's anti-fraud software provider company (AFSP).

The conceptual map developed from the frame of reference earlier presented resulted in the construction of seven interview guides (Table 1, Appendix I). The interviews were mainly based on a single session per participant, each lasting between 20 minutes and 1 hour, depending on the length of the guide; the interview with HMA's COO was a two-session exception, since not only was she the main informant, but was actively involved in the different business fronts, with regular interactions with customers, suppliers and other partner companies – factors that justified the choice of a longer set of questions.

After collecting the data, MAXQDA was used to assist the analysis in three phases: first, summarising was used to condense the meaning of each interviewee's answers and to tackle the main themes emerging from the interviews; second, primary and secondary data were subject to a process of categorization; third, data was unitized (Saunders et al., 2015).

#### *4.3. Data quality and analysis*

Concerning reliability and validity (Saunders et al., 2015), the use of secondary data and interviews was planned and executed with rigor in mind, ensuring the reliability and trustworthiness of all the secondary sources; and the careful planning and execution of primary data collection, with the necessary transmission of credibility and confidence to the interviewees. This process included not only a deep investigation of the research topic prior to interview design, but also the pre-test of the guides with field experts.

### 5. CASE STUDY – THE CASE OF HANG MY ADS

The chapter that follows presents the case study's results, according to the research framework that guided the data collection: it first includes a mapping of the MAAE at the light of the interviewees perceptions; an explanation of the fraud issues that affect the business within the MAAE follows; the results from the inquiry over adaptation processes between advertisers and publishers are then presented; and finally, the chapter is closed with an overview of the effects of fraud in the MAAE.

#### *5.1. Mapping of the network of the MAAE*

The interviewees' perceptions over the way the network of the MAAE is organized reveals three levels of market players: advertisers (clients), intermediates and publishers (suppliers). All interviewees consider the app developers to be on top of the chain, followed by the intermediary players – usually ad agencies (which in turn contract advertising services to ad networks) or directly ad networks. The ad network then uses a multitude of traffic sources to serve an ad, such as: directly integrated apps; publishers (also known as affiliates); platforms like ad exchanges, RTBs or DSPs; and/ or other networks (a practice known as re-brokering).

Advertisers are responsible for managing budget allocation, with the campaigns' goals and the necessary metrics to achieve them in mind; they are also responsible for negotiating promotion terms, playing a fundamental role in deciding and implementing performance models. On the other end of the chain, publishers are accountable for a deep knowledge of their traffic sources and for the best management strategy of their users, so to meet as much as

possible the advertiser requirements; however, this might not always be the case, as some publishers are more concerned in maximizing the profits of their promotion placements, with little concerns over quality achieved. Ad networks serve as mediators between the first and the former, monitoring in real-time what is being delivered and optimizing performance towards the best fit between client requirements and publisher capabilities, ultimately achieving an optimal ROI for the campaign.

While the two HMA account managers consider the agencies that manage most big app developers' campaigns to be the main players within the industry, the company's co-founders name the traffic sources as the most important players, for they have the power to dictate the standards for real, fraud-clean and quality traffic across the industry.

In other markets and business areas a huge importance is given to the client, but I believe specifically in digital advertising an equal importance should be assigned to both [client and supplier], because you can't have one without the other. I would even say that often the most important ends up being the relationship with the publisher and having good and legitimate traffic sources; good clients will eventually follow... Having good publishers comes with achieving good clients, more than the other way around. (HMA's COO)

By operating as an intermediary between advertisers and publishers, HMA relies on different strategies towards relationship management: on one end, clients have the financial power and require some work at the level of expectations management; on the other, publishers require a careful management of how their traffic is monetized. On either side, a uniform but personal approach is pursued, not only when it comes to new business opportunities, but also when it comes to daily account-management: the attribution of a dedicated point of contact to each business relationship is a standard policy; nevertheless, the importance of the partner may dictate higher levels of attention and flexibility towards day-to-day business and negotiations.

Regarding market factors, major challenges posed by the MAAE are highlighted: lack of transparency, often linked to re-brokering the chain; lack of regulation, making it harder to standardize processes and seek for specialized support; and the threat of fraud, in terms of detection and prevention. Other challenges are related with the increased growth of analytics (and the strict quality and user behavior metrics that emerge from this trend); the fierce competition between companies (especially ad networks); the difficulties in finding traffic sources in certain geographies; and the full understanding of the implications and potentialities

that different ad formats present, combined with the potential – still to be explored – offered by cross-media strategies.

The interviewees consider that the lack of regulation is justified by the industry being relatively recent, explaining that the industry is still at a self-regulation stage, where companies adjust themselves to a mix of different laws, from different countries, often at the light of what applies to other industries' services. The lack of specialized entities combined with the fact that business takes place in the cloud, make it even harder to apply any concrete laws and creates huge uncertainty for companies. Regarding fraud specific legislation, the AFSP representative explains why fraud is not covered by industry-specific legislation:

There's no specific thing you could put in a law or something... there have been law cases and we've been asked to testify (...) in some cases, but in general it's a tricky thing, because it's very difficult to define what fraud is and what is not in concrete legal terms. Also, technically it's not possible to see that the same person installed an app, for example; nobody has that technology and even if we had, for privacy reasons it wouldn't be allowed to use it. We're only looking at assumptions. (AFSP)

Considered the industry challenge with the heaviest impact on inter-company business, fraud is highly linked to the termination of advertiser-publisher partnerships and to the creation of great instability, as a consequence of seriously damaging credibility and trust across the ecosystem.

On the other hand, challenges such as the most suited ad formats to use dictate the ways companies search for new business partners; and challenges such as the tight competition require companies to undergo major efforts to stand-out in the map (be it at the level of their service processes, at the level of anti-fraud strategies, etc).

### *5.2. Fraud issues within the MAAE*

Major issues are associated with fraud. First, the issue of the lack of transparency in the industry has great impact on how fraud develops: mobile is by nature very complex and hard to track, a challenge amplified by complex value chains that inflate performances and “create opportunities and financial incentives for fraud to happen in the first place” (Forrester Consulting, 2017). Hence, re-brokering emerges as one of the greatest cracks through which fraudsters exploit the advertising chain and sell bot traffic as human traffic:

The network places the ads with publishers that it has direct relationships with, but cannot itself fulfill the entire ad campaign. (...) So the networks brokers with other networks who have access to supply (sub-publishers). (...) In some cases, the re-brokering happens more than once. And in the re-brokering process (...) traffic quality can suffer. (Koetsier, 2017)

Second, not only fraud is never fully identified, but is constantly getting more sophisticated. Yet, most advertisers are still unable to identify common and easily traceable frauds, underestimating its impact on advertising efforts (Forrester Consulting, 2017). Another major issue has to do with the lack of incentives to fight fraud: frauds that steal organic installs are the best in the market in terms of user quality metrics; by looking at this data and prioritising – without knowing it – fraudulent sources over legitimate ones, advertisers are not only paying for installs that otherwise would be free – for being organic –, but are also allowing little space for legitimate networks to compete.

The major fraud behaviors identified within the MAAE vary between simpler and older forms of fraud – like the use of VPNs and proxies; the duplication of IPs and other IP anomalies; the use of emulator/ bots, and device farms; click flooding/ click spam and install hijacking/ click injection – to more complex and recent forms – such as new device fraud; contribution rate; and SDK spoofing. A summarising table of the major fraud forms affecting the MAAE is presented at Table 2 (Appendix II).

The most common fraud types HMA deals with are VPNs, install hijacking and click spamming. For the managing partners, fraud is a highly relevant topic that requires companies to constantly and quickly react and adapt:

The issue of fraud is very relevant to the industry. It's vital that companies act swiftly to the new types of fraud that emerge – the challenge lies not only in prevention, but also in adaptation. (...) Companies must adapt very fast if they want to survive and continue to be known for the best reasons in the market.

At HMA this issue is also very relevant. We end up investing in anti-fraud software solutions, adapting our platform to automatically reject conversions that we believe to be fraudulent, reacting more promptly and containing the problem. (HMA's COO)

Because of damaging past experiences with fraud, and a great concern over the impact it may have over their business, HMA has a clear strategy for prevention and defense against fraud, by combining real-time data analysis with manual analysis/ validation. Besides from constantly analysing the data provided by the MMPs and the third-party fraud detection tool

integrated with their platform, the platform itself holds some in-house developed capabilities for fraud detection and campaign measurement. In terms of campaign and traffic sources management, rules that cover the allocation of budgets to sources in the beginning and long-term stages of the campaigns, help keep track of quality and play a great role in preventing major issues should any fraud be spotted. Nevertheless, the company's COO notes that such measure is simultaneously beneficial and limiting since "with so much prevention, sometimes we end up stagnating a bit to avoid bad traffic, instead of increasing revenues".

HMA's CTO points out to an important dilemma: although it should be very easy for an ad network to bet exclusively on serious and clean traffic, the industry is still at a point where the fraudsters score best in quality than the real users, and therefore are often given priority over legitimate networks. In such a scenario, an ad network that chooses to completely eradicate fraudulent sources may put its chances of survival at risk since the misled expectations of the advertisers lead to misled decisions over which sources to allocate budget to. The dilemma lies in the fact that the fraudulent installs the advertiser (mistakenly) chooses to pay for, are, in fact, organic installs they would never need to pay for – creating a wasted investment gap. Fortunately, the trend is starting to change.

All publishers compete for the best results; some of them use doping, achieving outstanding results and forcing others to do the same to avoid being left behind. Slowly, we're starting to see advertisers finally distinguishing between traffic sources and increasingly valuing those publishers that are clean from fraud as opposed to those that present them with great (often false) numbers. (HMA's CTO)

### *5.3. Adaptation processes*

The data survey on how fraud issues affect the intercompany adaptation processes uses a single concept from the research framework – adaptations – that is adapted according to the interviewee context: publisher (supplier) or advertiser (client).

#### *5.3.1. Adaptation processes by publishers*

When asked about the major challenges or struggles faced when working with an advertiser, both HMA's COO and AM reveal feeling difficulties when trying to make the company stand out against competing ad networks; furthermore, they link this with the challenge of establishing trust at the beginning of a new collaboration: on the one hand, as publishers, they try to show the prospective client the ways the company differentiates itself through its working processes, its anti-fraud mechanisms, and the outcomes they achieve by

combining those strategies; on the other, the challenge of trust is also dependent on how each client works, and, especially, how the first few month's validation of numbers, fraud claims and payments comply with the agreed terms and deadlines. Another great challenge highlighted by HMA's COO and the PPC is the threat of fraud to the relationship, the need to constantly stay on top of it and, ultimately, the struggle it causes when trying to balance volume and quality expectations without damaging the relationship.

In an early stage of the relationship, it's difficult to deliver the volumes [advertisers] expect, without being afraid to reach them; it depends on the campaigns, but some campaigns have various performance metrics, others various anti-fraud metrics; such metrics often require some time to evaluate, and we feel afraid. (HMA's COO)

When the industry first started off, five years ago or so, it started to trigger installs, but no one was looking at quality, no one was looking at fraud. Now, plenty of advertisers not only require that everyone stay on top of fraud but quality too (...). The broader issue is that everyone wants quality users, but they also want scale; and finding the right sources that can deliver a high number of installs with the quality they want is a big challenge. (PPC)

Adding to these challenges, HMA's AM highlights that often publishers feel obliged to comply with advertisers' demands, especially when they fail to comply with the agreed contractual or financial terms: "I need them more than they need me, so I have to give way of some of my own demands sometimes".

Besides from demanding the use of direct traffic and making some requirements over the type promotion options, budgets and KPIs to work under, not many requirements are imposed by advertisers. The early stage of the relationship is characterized by a mutual process of negotiations around legal and financial terms and guarantees, payment and activity validation deadlines, and some general demands over the contracted advertising service – all clearly stated and signed by both parties on a so-called insertion order (IO). At this point, advertisers are mostly concerned over: the publisher being a good fit with the advertiser's goals; having return from the time invested in opening the new collaboration; the publisher being clean of fraud and not re-brokering the advertiser's campaigns; the publisher's reputation in the industry.

All interviewees agree that fraud is a highly relevant issue in the MAAE, often leading to advertiser-publisher relationships' dissolution. As PPC notes, "It's not just convincing someone you don't have fraud, because fraud is everywhere in the industry", explaining that "what is

expected is that we're on top of it as much as possible (...) and that we're working to catch up with fraud". Publisher's strategies to transmit confidence and credibility to an advertiser range from constantly monitoring and optimizing campaigns towards industry's guidelines for fraud alerts; to a proactively assuming fraud when it happens and immediately applying measures that avoid further damage, as opposed to trying to get it unnoticed – as HMA's COO notes.

Adjustments at various levels need to be made by publishers to meet advertiser's requirements/ concerns over fraud: as their direct developer's portfolio grows, publishers need to increase their access to anti-fraud tools and maintain close communications with MMPs and other relevant companies that help them identify fraud as it develops. In addition, publishers adapt their approach towards seeking new business with advertisers and some – like HMA – are even making efforts to join anti-fraud coalitions.

The service planning and scheduling process may always differ, depending on the advertiser, the budget provided, and the stability of the campaign(s); prices may be subject to negotiations, and budgets and KPIs are usually subject to reviews and adjustments according to the outcomes of optimizing each campaign; furthermore, some bigger players in the ad networks market have specific departments dedicated to outlining tailor-made promotion strategies to each advertiser, in order to optimize the service delivered as better as possible – as is the case with PPC.

Information exchange is another process that varies widely from advertiser to advertiser but is usually not subject to significant adaptations, as long as communications are kept as open as possible between the parties, and the advertiser is willing to share campaign specific information (unfortunately, not always taken for granted) – such as quality feedbacks. To get around information exchange barriers, HMA makes a major effort to gain access to their client's campaign analysis tools, which not only provides the company with a deeper control over campaign performance, but also saves the client a considerable amount of time, by cutting the need of feedback reports – the major adaptation lies in adjusting the analysis to the different MMP platforms used by advertisers. Adaptations at the level of the production process, depend largely on how well established the relationship is and on the information exchanged, since as more information is provided, the better campaigns can be optimized towards advertiser's objectives – although the specific goals/ metrics that evaluate a campaign's performance do not change, budgets and prices may do so while the campaign is delivered, depending on how well quality expectations are being met.

Financial and contractual terms and conditions rarely undergo changes after the initial agreement between the parties, unless extraordinary legal/ regulatory circumstances require so. However, as HMA's AM notes, the validation of numbers and payments have been getting gradually delayed, as the need for deeper/ longer investigations of the traffic delivered increases on advertiser's end. Organizational structure adaptations are also very rare: at HMA the only significant change was the creation of a client dedicated specific team, two years ago.

Other changes may take place, depending on each company's needs: for example, at PPC a dedicated fraud team was created to handle fraud claims; similarly, HMA is constantly improving its own platform as a way of increasing its anti-fraud/ performance evaluation processes. Furthermore, minor adaptations from a publisher may be needed to meet and fulfill each advertisers' requirements and processes, as well as to effectively manage the relationship: "only after a month of activity can you understand what works and what needs to be adjusted in terms of fraud, in terms of KPIs, etc; before that, this is all a little uncertain" (HMA's COO).

When fraud happens, two scenarios are possible. If the fraud event has a minor impact on the relationship, the situation is discussed with the advertiser and specific measures are immediately put in place (e.g. banning the fraudulent sources, adjusting processes), to avoid the same issue happening again. If, instead, the episode is more serious – either because it results in great revenue losses that seriously damage the relationship, or because the relationship is just not enough established to overcome the issue –, dissolution of the relationship is usually at risk. In such cases, although rare, future cooperation may be a possibility: the publisher should either have available a new product/ traffic inventory, or be able to show complete understanding of what factors caused the previous issue and what counter-measures were taken; another factor that may increase the chances of relationship reestablishment is, as HMA's AM notes, the fact that most MAAE companies reveal huge turnover rates among account managers, sometimes creating great gaps in past relationships' historic.

### 5.3.2. *Adaptation processes by advertisers*

When working with a publisher, advertisers point out several challenges. During an initial stage, challenges vary between making sure the traffic the publisher is selling is real, making sure there is a fit between the companies, and deciding whether to pursue a collaboration; understanding the publisher's technical and anti-fraud capabilities; negotiating the various service, financial and contractual terms; and making any necessary technical adjustments to the publisher. After the collaboration starts, advertisers highlight as particularly challenging: the

establishment of trust in the publisher; making sure the traffic used is really the traffic agreed upon; gathering as much information as possible about the publisher and creating a database as complete as possible about his traffic sources, to help allocating budgets and avoiding deductions as efficiently as possible; accurately analysing the collected information to support decision-making in case a fraud or any other issue puts the relationship future at risk.

At the beginning of a partnership, publishers usually require advertisers legal and financial information/ proofs; direct offers (usually with a maximum of two intermediates); regular optimizations that minimize deductions and help maximize revenues; and a pre-agreement over how fraud is handled and reported. Requirements over minimum monthly revenues or other specific conditions although less common may also occur. At this stage, the major concerns of a publisher are: making sure there is a good fit between the campaigns available and the traffic he can use, allowing for a good quality-scale balance and making it worth the time invested in integrating with the advertiser's tracking system; making sure the advertiser complies with the agreed payment terms; and making sure the advertiser's processes allow for maximum automation, so to maximize profits.

For advertisers, the issue of fraud in the MAAE is highly relevant and is associated with trust issues – particularly at the early stages of a relationship – and possible dissolution of collaborations. Along with performance and traffic quality, fraud dictates the potential and duration of advertiser-publisher relationships. To prevent fraud from a publisher, advertisers focus their strategies mostly on anti-fraud software tools with human validation; updated records of each publisher's performance and traffic sources are created to support decision-making if need be. In addition, as HMA's PM explains, initial trust on a publisher is largely dependent on the type of traffic he has to offer, dictating how his budgets are allocated, which campaigns he's given access to, and the classification he's assigned.

To avoid and deal with fraud from publishers, advertisers undertake adaptations at various levels. Advertisers need to make a constant effort to be on top of fraud, not only by investing in more/ better own and third-party anti-fraud mechanisms, but also by increasing the analytics behind campaigns' and publishers' performance evaluation. The approach towards seeking partnerships with new publishers is another dimension of change: the focus increasingly shifts from ad networks to direct sources of traffic; a deeper and wider set of filter questions is adopted at the early process of evaluating a publisher's potential; an effort is made to make sure the publisher's technical and integration capabilities are in line with the type of traffic he's selling; the sending of device ID information is requested as another measure to assure in-app traffic is

used; lastly, initial tests with the publisher are undertaken, to decide whether the collaboration is worth pursuing and to minimize the chances of the advertiser getting severely damaged by fraud. Company-specific adaptations may also occur: at HMA, the PM explains that a grading system was implemented to classify publishers according to the traffic each provided, and that small test budgets are given at the start of a campaign to all publishers to help decide which ones are most suited to keep delivering it – “this way creating a safety net in case anything goes wrong; of course sporadic issues may happen, by we try to avoid them as much as possible by constantly trying to adapt and improve our prevention measures”.

Regarding service planning and scheduling, the adaptation is an ongoing process while a campaign is live, mostly happening at the levels of budget allocation and calculation of prices – according to the type of promotion each publisher provides, the relationship historic and the publisher’s performance; pause, restart and end dates may also be subject to adaptations, especially when unexpected issues occur – e.g. orders coming from the developer or fraud/quality issues. Similarly, the production process may lead to technical adaptations and the optimization process may need adjustments – depending on the campaign, its KPIs and the publishers running it; overall, this process is characterized by constant adaptations.

In contrast, information exchange does not require significant adaptations since most processes are automatic: at HMA, for example, most optimizations can be done exclusively using their own platform and integrated tools, reducing the need to discuss them with publishers. Unless a fraud issue is spotted, there is no need to request much information to the publisher while the campaign is live since the promotion terms have previously been agreed upon; on the other hand, if there are fraud suspicions/ claims, specific evidence of the promotion may be requested to the publisher. Regarding financial and contractual terms and conditions, while APC notes specific terms may be agreed with a publisher and later be subject to change if the service provided is not satisfactory, both HMA’s COO and PM deny making any changes beyond the initial agreement between the parties (IO). As for organizational structure, adaptations are rare: at HMA the only significant adaptation was the creation of a publisher dedicated specific team.

Other adaptations by advertisers include: specific technical arrangements for a publisher, depending on how valuable the relationship is; and specific procedures and mechanisms that help preventing high-impact deductions in cases of fraud or poor quality delivered by a publisher.

When fraud happens, the importance of the relationship with the publisher determines its future. If the episode has a minor impact on the overall publisher activity, immediate measures are put in practice (e.g. banning the fraudulent sources, restricting the number of campaigns the publisher gets access to) and the account is kept active. Instead, if the episode has a major impact – either because the relationship is too recent and/ or because trust gets seriously damaged – the relationship might be immediately terminated without chances of further collaboration.

Ending a relationship is the most drastic decision an advertiser makes, and, unfortunately, it's been happening several times over the years – as HMA's COO notes. APC explains that "it's all about the relationship" and that "if someone is very valuable to us, we will go a very long distance to keep them happy and ourselves happy with the traffic". Furthermore, if not terminated, after a serious fraud issue, the partnership undoubtedly suffers a tremendous fall in monthly revenues as a result of the loss of trust in the publisher: "I need to focus my time into the best sources" (HMA's PM). If terminated, neither HMA nor APC have policies against future cooperation, however, they don't see any prospects in doing so either. APC believes re-establishing the partnership is possible in cases the relationship was not fully ended but, instead, just restricted, as long as the publisher is able to demonstrate he has taken measures that prevent the same issue from happening again; HMA's PM explains the relationship historic remains as an obstacle and although the same conditions are imposed, fewer chances are given to the publisher; HMA's COO believes re-establishing the partnership is very rare and "usually doesn't go very well, and the relationship is definitely terminated".

#### *5.4. Effects of fraud in the MAAE*

The monthly revenue lost for fraud "depends on the company and its strategies to prevent and handle fraud" (HMA's COO). At HMA the average monthly loss is around 5-10%, a number that has been decreasing year by year: "We take very few risks when it comes to new campaigns and have several preventive measures in place instead. We play it safe, and we naturally get less deductions (HMA's COO).

In contrast, AFSP estimates that around 10-15% of the global advertising spend goes into fraud. Industry's statistics reveal similar numbers: a report released by Tune – an MMP – finds that the average fraud across all ad networks is 15.17%, of which 23.3% of ad networks record fraud levels surpassing 20% (Koetsier, 2017); AppsFlyer – another MMP – estimates that the odds of an app install being fraudulent are 11.5% and that the global cost of fraud to advertisers

has grown 30% from roughly \$600 million a quarter in 2017 to \$700-\$800 million over the first quarter of 2018 (AppsFlyer, 2018). Accordingly, not only the amount of fraud advertisers are subject to has been increasing, it now affects over half of the mobile ad budgets (Forrester Consulting, 2017).

Apart from the great financial impact of fraud created by the large portions of advertising budgets being exposed and/ or lost to fraud, the issue directly affects advertisers' ROI, causing the acquisition prices to be lower and leading to a constant experimentation of new advertising models as an attempt to hinder fraudulent activity. The planning and allocation of budgets is another aspect affected by fraud: the degree of fraud from a partner dictates how heavily reduced or completely cut their budgets get; trust and budget allocation go hand in hand, so publishers with less fraud are seen with "more respect" (HMA's COO) and gain priority to "access better campaigns and better payouts" (APC); furthermore, advertisers start to rethink and re-plan their investments (Mobile Marketing Association, 2017).

Other aspects get severely affected by fraud. The most obvious being the damage in intercompany relationships, as well as in the industry's reputation, since trust between advertisers and publishers gets challenged and the integrity of the ecosystem gets degraded. Efficiency in business is also lost, due to the contamination of data and the huge investment of time spent in its undermined analysis: "artificially fraudulent inventory floods the market and decreases the value of legitimate (real human) inventory" (IAB, 2013). Also important is the damage fraud causes to users' experience, who are served poor quality ads or are redirected to different ads after the click. As AFSP notes, fraud is still seen as a sort of taboo topic in the MAAE, lacking openness to discuss it: on the advertiser side, fraud looks bad to his investors and, on top of this, attracts more fraud; networks, on the other hand, are faced with a dilemma between delivering a high-quality service to advertisers in order to maintain a good reputation and fulfilling their traffic needs; often "the investor body is not familiar with the issue, thinking it's just a matter of buying from a better source, without fully grasping the real dimension of the problem and the issues it causes every day" (AFSP).

Industry companies forecast that fraud will keep evolving into more sophisticated and diversified forms, requiring companies to keep adapting and finding ways to track and stop it, eventually eradicating older and fully preventable forms of fraud. Along the course, the investment in more specialized software companies will keep growing, increasing the complexity in the metrics available and widening its share along the chain. Thus, the increasing demand for transparency will lead to significant changes in the way the mobile supply chain

operates, revealing an increase in anti-fraud publishers' certifications and a trend for disintermediation of the chain: HMA, for example, has been reshaping its partner portfolio over the last year, by reducing to the minimum the number of intermediates up to the final traffic source, not only to reduce fraud, but also to increase control over the campaign. Lastly, companies will keep experimenting with promotion models as a strategy to avoid fraud and increase the efficiency of investments, leading to the shrinkage – already underway – of the incentivized business.

As for fighting fraud, every player should get involved if they want to survive in the industry, but MMPs “will play the largest role, without doubt” (HMA's CTO): not only do they have credibility and assume an impartial position in the chain, but they also have the largest data sets and mechanisms to detect fraudulent patterns first-hand. The win over fraud will, therefore, be largely linked to the extent to which companies get access to more transparent and automated detection systems and to the necessary improvement in data interpretation capabilities across all partners in the chain; in addition, advertisers should adopt appropriate volume/ performance expectations and increase complexity in campaign metrics; partnerships should be used strategically as a wall of resistance against fraud, by encouraging the creation of open communication channels and speeding up the share of information; companies should practice safe sourcing, by carefully choosing their traffic sources and by joining anti-fraud industry efforts; finally, payment for fraud should be blocked in a more stricter sense and suspicious sources should be blacklisted.

## 6. ANALYSIS AND DISCUSSION

Analysis of the qualitative data reveals that the economic model proposed by Mungamuru and Weis (2008) does not fully picture the outline of the MAAE. While the authors suggest that the online advertising market players can be organized into advertisers, advertising networks, and publishers, the data collected demonstrates that the MAAE should be organized into advertisers, intermediates, and publishers. By replacing “ad networks” by “intermediates”, one is allowing for a wider range of advertiser-publisher mediator companies along the chain to be considered, a change that feels highly suited in the context of the company studied and the outline of the MAAE.

Advertisers represent the highest rank in the chain because they fund the entire ecosystem. Both app developers and the ad agencies responsible for managing their budgets are included

in the advertisers' group. Furthermore, app developers can simultaneously be advertisers and publishers: first, they may need to acquire users for their app by advertising it on other apps/ media sources; on the other hand, they may need to monetize their "free" app by serving other apps/ brands' ads to their users. Hence, on the bottom of the chain are the publishers, who represent the supply of the industry and generate traffic to the top of the chain.

Intermediates manage ads from several app developers and ad spaces from several media sources. Included in this group are ad networks – as suggested by Mungamuru and Weis (2008) –, who buy traffic directly with the media source or through another intermediary, such as an AdExchange/ DSP or another ad network. AdExchanges/ DSPs, in turn, facilitate the transaction of online ad impressions by connecting advertisers – be they app developers, ad agencies or ad networks – with a vast inventory of media sources, usually through RTB systems and machine learning algorithms designed to offer more precise and refined targeting solutions with constantly optimized eCPMs to maximize conversion rates.

Intermediates play a crucial role in mediating both ends of the chain and effectively reaching an optimal fit between campaign goals and traffic delivered, ultimately, achieving the best outcomes in terms of user quality and ROI. Thus, one can speculate that intermediates can work as game-changers in assuring the availability of a legitimate, clean of fraud and high-quality inventory of media sources, since the data demonstrates that only with good publishers can an ad network close valuable deals with app developers.

The suggestion to include an additional group of players seems pertinent: technology companies would include those platforms such as AdExchanges, DSPs and SSPs that work as intermediates, but also those companies providing in-app measurement and tracking solutions (MMPs), as well as those companies developing and providing fraud detection tools. A visual scheme of the MAAE mapping is presented in Figure 3 (Appendix II).

Supporting the findings of Grewal et al. (2016), the data confirms that market factors such as nature of industry, partnerships, and regulations present companies operating in the MAAE with important restrictions and opportunities. Furthermore, Grewal et al. (2016) draw attention to the fragmentation of the chain, that leads to opacity in exchange systems and complex pricing schemes, challenges also brought up by the data. However, the case study's results do not reveal sufficient data to support the market differences' factor also listed by the authors.

Advertiser-publisher relationships in the MAAE are usually characterized by uniform management strategies with some degree of personalization. At the start of a new business

relationship, the major challenges for advertisers lay in the initial negotiation process and in making sure the traffic to receive is direct (not re-brokered); on the other hand, the major challenge for publishers lays in effectively managing quality-volume expectations at such an early stage of partnership. Both advertisers and publishers agree that the establishment of mutual trust and the threat of fraud are also major challenges at the start of a relationship, and that assuring enough business volumes that compensate for the time invested in opening the relationship is a major concern.

Fraud, lack of transparency, and quality/ re-brokering stood out as the greatest challenges faced by companies in the ecosystem; disintermediation, sustainable growth/ competition, and lack of regulation followed. The six appear to be highly related. One of the facts that makes fraud a major issue is the opacity of the chain associated with it, creating space and opportunities for illegitimate activities to happen in the first place; the lack of transparency also makes advertisers worry about the content and context in which their ads appear, putting at risk their brand's image and reputation and creating great difficulties for campaign performance and optimization. The longer the chain, the cheapest the traffic and the worst quality gets; the fact that good media sources tend to work more closely to the app developer/ agency, probably explains why re-brokering is so strongly associated with fraudulent traffic and why advertisers are not only demanding more transparency, but leaning towards a trend of disintermediation of the chain. In turn, disintermediation restricts the space to do business in the ecosystem, tightening the competition between companies and making it harder for each to stand out. Finally, the fact that the industry lacks specific regulation further emphasizes the difficulties felt, creating uncertainty and a lack of legislative support when conflicts arise.

In terms of different types of fraud, the qualitative data reveals a different classification scheme than the ones proposed by Daswani et al. (2008) and Zhu et al. (2017). The distinction between robotic and human attacks suggested by Daswani et al. (2008) does not seem to be significant in the context of the case study, for two reasons: first, all interviewees preferred to group different forms of attack under the single umbrella of mobile app fraud; second, all forms of attack make use to a greater or lesser extent of computer technology and programmed scripts, therefore being "robotic" by nature. On the other hand, the taxonomy of digital ad fraud provided by Zhu et al. (2017) that makes a distinction between placement fraud, action fraud, and traffic fraud appears to be little suited as well: firstly, Hang My Ads operates exclusively on performance-based advertising models, which immediately excludes forms grouped under placement fraud and traffic fraud from its operating context; secondly, the model proposed by

the authors pictures the phenomenon of fraud in the broader digital advertising industry and, naturally, one must take into consideration that the evolution from web to mobile brought about new forms of attack, leaving others behind.

Instead, the data collected finds that the forms that deserve to be mentioned as the major ones affecting advertising in the MAAE are: VPN fraud, IP fraud (particularly IP duplication), click flooding/ click spam, install hijacking/ click injection, bots, new devices, SDK spoofing, and farms. A more appropriate classification of such forms can be suggested: VPN, IP duplication and IP pattern can be grouped under the broader category of IP-Based Fraud; off-server bot, device-based malware and SDK spoofing can be grouped under Bot-Based Fraud; click flooding/ click spam and install hijacking/ click injection can be grouped under Click-Based Fraud; finally, new devices can be assigned to Farm-Based Fraud.

The dataset confirms the high relevance of fraud to advertiser-publisher relationships. Both the case study and the secondary data highlight that fraud is the number one cause of trust problems within client-supplier relationships, playing a central role in company reputation and often damaging intercompany partnerships. When fraud episodes do not end up in partnership termination, they certainly impact on the way the relationship develops, often demanding significant levels of advertiser-publisher adaptations. Fraud requires companies to quickly react and adapt in order to protect partnerships and stand out for the best reasons – this way, the data allows to infer that not only must companies seek a constant update over new and emerging forms of fraud, but also must undertake ongoing investments to improve their prevention and detection mechanisms, and, additionally, must work towards improving their sourcing to offer a cleaner traffic inventory. Such findings are in line with those of Brennan and Turnbull (1997b) that unilateral or mutual adaptation represents the ability of a company to react to environmental and market forces, being it a necessary condition for the existence of a partnership, its survival and its success. Additionally, the case study's results confirm the hypothesis presented by Hallén et al. (1991), and later emphasized by Brennan et al. (2003), that intercompany adaptations work as elements of a social exchange process and involve trust-building and power relations. For example, HMA's AM admits that often she needs to give in to the demands of some app developers and adjust some standard processes in order to close a deal.

Taking on the model proposed by Brennan et al. (2003), it can be agreed from the research that the single adaptations classification scheme is equally suited to adaptations undertaken by supplier and client organizations. The interviews disclose no significant difference between the number of adaptations undertaken by advertisers and by publishers, revealing that both parties

seem to adapt to each other in a similar manner. One can conclude that the findings by previous research that suppliers adapt more than customers (Baptista, 2013; Brennan et al., 2003; Schmidt et al., 2007) are not exactly applicable to the present study.

Nevertheless, differences in the processes advertiser and publisher adapt are spotted. Service planning and scheduling and production processes are subject to more adaptations from advertisers, with publishers only doing minor adaptations depending on the degree of freedom/power advertisers give them over campaign management. Adaptations at the levels of information exchange and production process seem to be largely dependent from each other: for example, the more feedback and details on campaign performance the advertiser provides (information exchange), the higher the level of traffic optimization (production process) the publisher can do. An interesting finding that can be taken from the case study is the fact that although advertisers are the clients, they appear to be the ones investing the most time in the production process, in the sense that they often make all decisions regarding campaign optimization and budget re-allocation without the publisher participating in the discussion. In contrast, adaptations of financial and contractual terms and conditions emerge as unlikely or rare from either advertiser or publisher. The same happens with organization structure adaptations, although it can be understood from the research that larger companies have evolved to the creation of specific departments that handle fraud issues: for example, the PPC has a dedicated fraud team that analyses in detail any fraud claims received and withholds payments of fraudulent traffic from its media sources. Adaptations at “other” processes, although less mentioned, are more commonly made by advertisers: for example, HMA changed its internal processes for sourcing new business with publishers, by implementing more extensive sets of selection criteria and questions.

Overall, it can be understood from the interviews that companies mostly adapt to meet the broader needs/ requirements of their partnership portfolio or to respond to industry forces – such as when HMA created a grading scheme to classify its publisher inventory and match their traffic with their advertiser inventory according to the app fit and the campaign sensitivity. Specific adaptations made to specific partners appear to be rarer and are mentioned only once at the dataset, when the APC explains the specific technical arrangement made to adapt to a valuable publisher whose app was experiencing a breach that allowed fraudsters to exploit campaigns and illegitimately get rewards for engagement actions they hadn't completed – something that was built specifically to solve a problem with a specific publisher and was never used for any other publisher.

Nonetheless, adaptations that emerge from specific fraud issues with specific partners may end up having positive outcomes in other relationships – such as when one of the advertisers working with the PPC developed his own tool to profile users and started cutting the budgets for promotion with the PPC; although later the PPC managed to develop new core processes to optimize its traffic and meet the advertiser's requirements, the relationship state had no turn back, but at least the new processes were being used by the PPC itself to evaluate its media sources. These findings come to confirm the inferences made by Anderson et al. (1994) and Halinen et al. (1999) regarding the possibility of connected and disconnected changes taking place within the dyad and the network effects of dyadic interaction – in this case, the network effects of adaptations generated within an advertiser-publisher relationship and propagating to the extended partnership portfolio.

Regarding the effects of fraudulent activities in the MAAE, the findings by Daswani et al. (2008) are confirmed by the case study: fraud has a negative financial impact in the ecosystem, leading to a great portion of the advertising spend to be wasted with fake or poor-quality traffic and, consequently, to poor results in terms of ROI for advertisers. Yet, an interesting fact is brought up by the AFSP interview: fraud does have a negative effect on the advertising ROI, but prices already account for a certain level of fraud if one thinks that without fraud publishers would be delivering only top users and therefore acquisition prices would be much higher than they are today with fraud, in which case ROI would naturally be much higher as well. The findings by Jain et al. (2010) that advertisers are likely to adjust their budget allocation strategies depending on the intermediary/ publisher's competence to detect and report fraud are also confirmed by the case study. In fact, the data reveals that advertisers' budget allocation decisions are dependent not only on the publisher's capability to handle fraud, but, above all, in the overall trust the advertiser has in the intermediary/ publisher's traffic. Also related to budget allocation, is the fact that advertisers constantly seek for and experiment with new advertising models in an attempt to avoid fraud and maximize ROI.

Furthermore, the data collected shows that other effects need to be considered when evaluating the impact of fraud on the MAAE, namely: damages to intercompany relationships; negative effects on user experience; damages to the industry's reputation; lastly, a negative impact on companies' efficiency, since it contaminates and inflates tracked data, therefore requiring companies to engage in time-consuming processes of data analysis and validation.

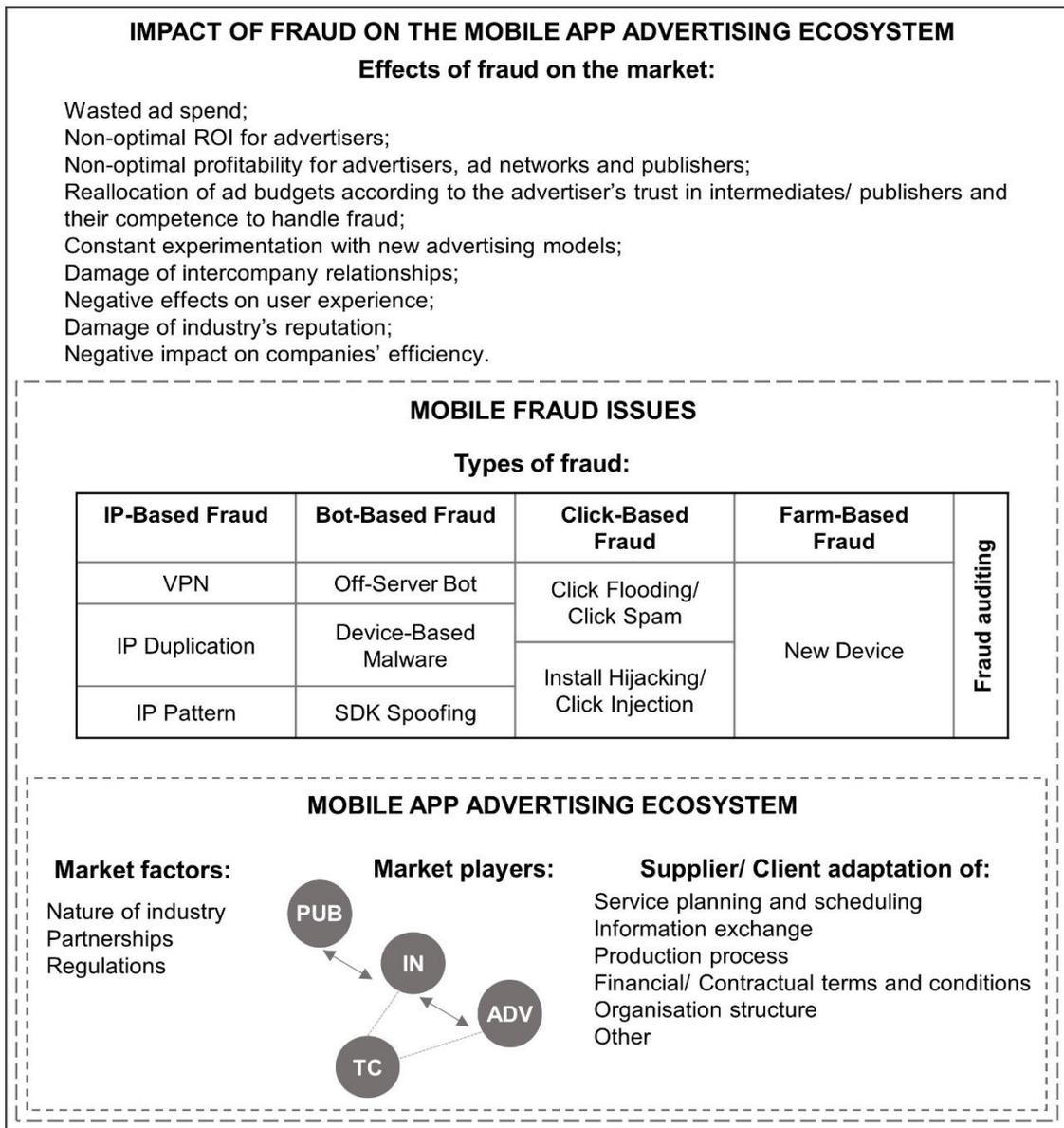


Figure 2: Modified framework of analysis.

Although in some way the data collected confirms there is a problem of disincentives to fight fraud, it also leads one to agree with the research outcomes by Mungamuru and Weis (2008) and Daswani et al. (2008): companies should not let go fraud unchecked and ad networks, in particular, can gain significant competitive advantage if they aggressively fight fraud, by providing advertisers with better ROIs, and by improving their own and their publishers profitability. Despite this, the economic disincentives mentioned by Cho et al. (2016) cannot be disregarded and similar findings emerge from both the secondary data collected and the case study; however, such trend is considered to be changing as the industry evolves to more

accurately detect and handle fraud, and, therefore, intermediates that choose to not participate in the fight towards mitigating fraud, will eventually be eradicated.

The case study outcomes and analysis allow to suggest a modified framework of analysis: the original frame of reference and the literature review serve as a starting point to improve the model used to guide the research, by adjusting the dimensions under study to the findings that emerged. The modified framework of analysis presented in Figure 2 entails the necessary changes/ improvements at the levels of market factors, market players, types of fraud and effects of fraud on the market, in an attempt to build a more suited model to the business setting and phenomenon addressed.

## 7. CONCLUSION

The final chapter of this dissertation sums up the findings of the study against the research questions initially presented. A brief reflection over the theoretical contribution of the study follows; and relevant recommendations for further research and for management close this work.

As smartphone usage keeps growing, advertising investment has been increasingly targeting mobile media, particularly, mobile apps. The scale of mobile ad fraud has been following the trend, posing great challenges to the way companies relate with their partners and adapt to each other. Thus, the research aimed to understand how fraud in the mobile advertising industry affects intercompany relationships, particularly between advertisers and publishers: it started by looking at how the MAAE is organized and how companies partner with each other; it continued with an analysis of how fraud affects the adaptation processes undertaken by companies; and it finalized with a sum up of the main effects of fraud in the ecosystem.

Although similar to what Mungamuru and Weis (2008) suggest, the findings of this study reveal that the MAAE should be organized into advertisers (app developers and ad agencies), intermediates (ad networks and AdExchanges/ DSPs), and publishers (app developers or other media sources). In addition, the suggestion of a fourth group of players feels pertinent within the context of the MAAE: considered as technology companies are not only the AdExchanges, DSPs and SSPs that simultaneously belong to the intermediates group, but also MMPs and anti-fraud software providers. Even though simply pictured, the ecosystem's outline emerges as a very complex setting with no clear boundaries between players, since app developers simultaneously contract advertising campaigns and serve other developer's ads on their apps;

on the other hand, ad networks simultaneously work as suppliers and customers; publishers, in turn, are often not the final source of traffic.

Several issues emerge from this sort of ecosystem mapping. In line with Grewal et al. (2016), the data confirms that market factors such as the nature of industry, partnerships, and regulations present companies with significant restrictions and opportunities that impact their activities; the market differences' variable, in contrast, does not find enough data in the study to support the authors' model. Amongst the main challenges faced by industry's professionals, issues such as fraud, lack of transparency, quality, competition, lack of regulation, and fragmentation of the chain emerge as some of the highest impactors to intercompany relationships. All challenges appear to be highly interrelated.

Regarding how fraud affects the adaptation processes undertaken by advertisers and publishers, the research is divided into a comprehension of the different types of fraud that threaten mobile app advertising, and an understanding of how they influence the need for companies to adapt to each other. The classification schemes presented by Daswani et al. (2008) and Zhu et al. (2017) do not appear to accurately classify the forms of fraud that most affect the MAAE companies of the focal context under study. Instead, the major forms that emerge can be classified under the umbrellas of IP-Based Fraud, Bot-Based Fraud, Click-Based Fraud and Farm-Based Fraud; and vary between VPN fraud, IP fraud, click flooding/ click spam, install hijacking/ click injection, bots, new devices, SDK spoofing, and farms.

The case study confirms the high relevance of fraud to advertiser-publisher relationships, often leading to trust and reputation issues, and demanding significant levels of adaptations to protect partnerships. The single adaptations classification scheme proposed by Brennan et al. (2003) proved to be appropriate to the study, since no difference was found in the processes advertisers and publishers adapt as a consequence of fraud. Contrasting with prior literature (Baptista, 2013; Brennan et al., 2003; Schmidt et al., 2007), advertisers and publishers in the MAAE seem to adapt to each other in a similar manner. Despite this, differences may be identified: service planning and scheduling and production process are subject to more adaptations from advertisers; adaptations at the levels of information exchange and production process seem to be largely dependent from each other, but contrary to what might be expected, advertisers (customers) appear to invest considerably more resources than publishers in production process adaptations; on the other hand, adaptations of financial and contractual terms and conditions emerge as unlikely or rare from either party; organization structure adaptations appear to be largely dependent on company size; finally, adaptations of "other"

processes appear to be more common by advertisers. Specific adaptations made to fit specific partners emerge from the case study as rare; instead, companies work towards adapting their overall working processes to better handle fraud issues and better manage relationships with their partners. The arguments by Anderson et al. (1994) and Halinen et al. (1999) regarding the possibility of connected and disconnected changes taking place within the dyad and propagating to the broader network are reinforced by the case study.

Concerning the effects of fraud in the MAAE, the case study confirms the waste of ad budgets and poor results in terms of ROI to be linked to the negative financial impact of fraud in the ecosystem and to lead to adjustments to budget allocation strategies depending on an intermediary/ publisher's competence to detect and report fraud – findings that match Daswani et al. (2008) and Jain et al. (2010). In addition, the case study reveals that decisions over budget allocation are greatly associated to the advertiser's trust on the intermediary/ publisher and to a constant experimentation on new advertising models that reduce fraud and maximize ROI. Other effects arise from the research: the damage to intercompany relationships; the damage to user experience; the damage to industry's reputation; and the damage to companies' efficiency.

Research on business relationships and interaction has been applied to different business settings. This dissertation brings a relevant theoretical contribution by combining the study of adaptation processes to a relatively recent business setting: the advertising of and in mobile apps. The following aspects are emphasized from the research: the re-mapping of the mobile advertising ecosystem with app promotion companies at focus; the fact that, contrary to other industries, advertisers and publishers seem to adapt at similar levels, only revealing few differences in the processes each adapts the most; the re-classification of the fraud forms that most affect the MAAE; and the deepening of the effects of fraud on the ecosystem of companies.

The outcomes of the case study made it clear that the future of the MAAE will lead companies to experience profound changes in how they do business, how the supply chain works and how higher demands for transparency will change sourcing strategies. In order to survive, everyone in the ecosystem will need to actively take part in the fight against ad fraud: not only MMPs and fraud specific companies, but advertisers and intermediates, particularly, will be forced to improve their practices of safe sourcing new business partners, as a way of decreasing the chances of getting defrauded. Companies must adopt safer sourcing practices and seek cleaner traffic inventories. A constant and increased investment in fraud measurement tools and educational strategies to keep up with fraud's evolution will be crucial. Overall, the

great effort made by companies that decide to proactively combat fraud will be compensated by upturns in competitive advantage, recognition, spending from advertisers, and higher profits.

The limitations of this dissertation stem mainly from time constraints. Collecting data from multiple companies would have been the ideal sample for this case study; however, limitations from the time horizons of the dissertation and limitations from the researcher in reconciling academic and professional obligations, made it an unviable path for this research. In addition, the difficulty of access to some secondary data and the fact that part of the secondary data used had been gathered for different industry settings (business and performance models) must be put forward as constraints to this study as well.

The suggestion of a modified framework of analysis may function as a starting point for further empirical work on the effects of mobile fraud on the advertising ecosystem. Further research may explore more deeply the ways fraud affects intercompany relationships; particularly, how it affects exchange and coordination episodes between advertisers and publishers. On the other hand, future work could also take on the proposed model and apply it to a wider sample, inquiring a broader set of companies from each group of players of the ecosystem and possibly bringing new and richer outcomes of which could be easier to drive generalizations from. Lastly, future research would benefit from a longitudinal design, by analyzing the development of specific advertiser-publisher relationships and the impact fraud episodes represent to the way the relationship changes over time.

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## APPENDICES

*Appendix I*

Questions	HMA				A P A			
	C	C	A	P	P	P	F	
	O	T	M	M	C	C	S	
	O	O					P	
<b>Company</b>								
Briefly describe the business of your company and your current job role.						X	X	X
<b>1) Who are the different players within the mobile app advertising industry and how can the relationships between them be mapped?</b>								
How do you outline the network of the MAAI?	X	X	X	X				X
Considering it represents a relatively recent business ecosystem, how is the MAAI regulated by industry specific authorities?	X	X						X
In your perspective, what are the major challenges posed by the MAAI?	X	X	X	X				X
How do they impact on the business for enterprises?	X	X	X	X				X
In your perspective, what is the future potential of business in the MAAI?	X	X	X	X				X
Who do you consider to be the main actors/ types of companies within the MAAI?	X	X	X	X				X
What is the role of advertisers?	X	X						
And the role of publishers?	X	X						
What is the role of advertising networks?	X	X						
What different types of business relationships does your company maintain with its stakeholders?	X	X						
Which of these partnerships are the most important, in your perspective? Why?	X	X						
And the least important? Why?	X	X						
What different strategies according to different partnerships is Hang My Ads using for relationship management?	X	X	X	X				
<b>2) How do fraud issues affect the adaptation processes undertaken by publishers (suppliers)?</b>								
When working with an advertiser, what are the major challenges/ struggles you face?	X		X					X
When starting business, what are the requirements imposed to you by a new advertiser?	X		X					X
And what requirements do you impose to a new advertiser when starting business?	X		X					X
Overall, what do you point out as the major concern of an advertiser when choosing to do business with you?	X		X					X
In your perspective, what is the relevance of the issue of fraud in the MAAI in your relationship with an advertiser?	X		X					X
Regarding protection against fraud, what is your strategy to transmit confidence and credibility to an advertiser?	X		X					X
Considering the impact of fraud in the MAAI, what kind of changes/ adjustments has your company been doing to its processes to be able to adapt and please an advertiser?	X		X					X
Considering the different processes of service planning and scheduling, information exchange, production process, financial and contractual terms and conditions, and organization structure – which ones are subject to adaptations when working with different advertisers?	X		X					X
Are there any other processes/ business practices that your company undertakes in order to protect itself and its advertisers from fraud issues?	X		X					X

Think of a specific advertiser your company had to adapt for to respond to his fraud concerns – what specific adaptations to your business practices/ processes were made to satisfy this advertiser?	x	x	x
Please describe the overall context – past and present – of the relationship between your company and that advertiser.	x	x	x
In the case of relationship termination due to fraud issues, are there any chances of future cooperation? If so, under which conditions?	x	x	x
How relevant is fraud in the MAAI to Hang My Ads' business? Why?	x	x	
What different types of fraud take place in the MAAI?	x	x	x
Which of them does your company most commonly deals with?	x	x	x
What fraud prevention and defense strategies is Hang My Ads using?	x	x	
<b>3) How do fraud issues affect the adaptation processes undertaken by advertisers (clients)?</b>			
When working with a publisher, what are the major challenges/ struggles you face?	x	x	x
When starting business, what are the requirements imposed to you by a new publisher?	x	x	x
And what requirements do you impose to a new publisher when starting business?	x	x	x
Overall, what do you point out as the major concern of publisher when choosing to do business with you?	x	x	x
In your perspective, what is the relevance of the issue of fraud in the MAAI in your relationship with a publisher?	x	x	x
Regarding protection against fraud, what is your company's strategy to build its confidence on and prevent fraud from a publisher?	x	x	x
Considering the impact of fraud in the MAAI, what kind of changes/ adjustments has your company been doing to its processes to avoid and deal with fraud from a publisher?	x	x	x
Considering the different processes of service planning and scheduling, information exchange, production process, financial and contractual terms and conditions, and organization structure – which ones are subject to adaptations when working with different publishers?	x	x	x
Are there any other processes/ business practices that your company undertakes in order to protect itself and its publishers from fraud issues?	x	x	x
Think of a specific publisher that committed fraud when working with your company – what specific consequences/ adaptations occurred in your company's relationship with that publisher?	x	x	x
Please describe the overall context – past and present – of the relationship between your company and that publisher.	x	x	x
In the case of relationship termination due to fraud issues, are there any chances of future cooperation? If so, under which conditions?	x	x	x
How relevant is fraud in the MAAI to Hang My Ads' business? Why?	x	x	
What different types of fraud take place in the MAAI?	x	x	x
Which of them does your company most commonly deals with?	x	x	x
What fraud prevention and defense strategies is Hang My Ads using?	x	x	
<b>4) What are the main effects of fraud within the mobile app advertising industry?</b>			
How does the issue of fraud in the MAAI affects the overall business of your company?	x	x	
What do you estimate to be the monthly revenue loss (%) for your company, after fraud claims?	x	x	
In your perspective, what are the main effects of fraud issues in the business within the MAAI?	x	x	x



<b>Fraud</b>	<b>Definition</b>	<b>Source</b>
<b>VPN Fraud</b>	A VPN (virtual private network) – or proxy – uses encryption for internet connection allowing different IP addresses to be simulated and making it impossible for tracking systems to attain users’ real location. Although not usually considered illegal, device farms often use VPNs to hide their locations and fraudulent activity.	Hezel, 2018; Mobile Fraud Glossary, 2018
<b>Duplicate IP</b>	Duplicate IP detection is flagged when conversions from the same offer come from identical IP addresses during a specific timeframe.	Fraud Reasons, 2018
<b>IP Pattern</b>	IP pattern fraud is flagged when conversions from the same offer score high in IP address similarity, usually associated with the fraudsters resetting their IP address to artificially increase the volume of illegitimate conversions, while avoiding duplicate IP detection.	Fraud Reasons, 2018
<b>Bots</b>	Bots are one of the most widespread fraud mechanisms and can take either of two forms: a bot that is run off of servers, attempting to simulate specific user behavior, such as ad clicks, app installs and in-app engagement; or a device-based malware, attempting to simulate ad impressions, clicks and in-app engagement. Fraud originating from bots or device farms represents false installs.	Mobile Fraud Glossary, 2018
<b>SDK Spoofing</b>	SDK spoofing is another form of device-based bot tactic, where open source SDKs are used as gateways to simulate in-app behavior.	Mobile Fraud Glossary, 2018
<b>Click Flooding/ Click Spamming</b>	Click flooding (also known as click spamming) hijacks organic conversions by overloading the attribution system with an abnormally high volume of clicks – part of them matched to organic traffic and attributed as legitimate. Click flooding represents installs from real users where attribution has been compromised.	Fraud Reasons, 2018
<b>Install Hijacking/ Click Injection</b>	Install hijacking (also known as click injection), in turn, uses malware on devices (often hidden in apparently legitimate apps) to identify the moment an organic install begins and to send false click reports during the install process to claim its attribution. Install hijacking represents installs from real users where attribution has been hijacked.	Mobile Fraud Glossary, 2018
<b>New Devices Fraud</b>	New devices fraud is flagged whenever devices used for promotion have not yet been recorded with a significant amount of activity on DeviceRank™ – the world’s largest anti-fraud database and the only platform with enough scope to effectively identify device ID reset fraud behaviors. Device ID reset fraud consists of fraudsters clicking on real ads, installing and engaging with the actual apps before resetting their device IDs in-between each install, effectively generating significant volumes of “real” clicks, installs and retention from new device IDs.	Mobile Fraud Glossary, 2018

Table 2: Fraud forms.