

# **Understanding the Value Chain in Programmatic Advertising**

Michael O'Shea

1 December 2019



<b>Author(s)</b> Michael O'Shea	
<b>Degree programme</b> Business Information Technology	
<b>Report/thesis title</b> Understanding the Value Chain in Programmatic Advertising	<b>Number of pages and appendix pages</b> 41
<p>Programmatic advertising uses data, machines and systems to buy advertising space. It is one form of data-driven marketing and the largest contributor to online advertising. Many steps of traditional marketing have been automated to the extent that the human side of the process is diminishing. Programmatic advertising relies on data targeting to show the right people the right ads at the right time. The research paper discusses how programmatic advertising works in a general sense and to understand this, the paper goes through a chronological timeline of the brief history of programmatic advertising and the ways that automation and technological breakthroughs enable significant advancements in modern marketing.</p> <p>The goal of this research is to gain an understanding in to the value chain of programmatic advertising, find out how and what data is being used to make this happen and how much of the process is automated. The research brings light to how companies use data, how they acquire the data and how do they benefit from the data.</p> <p>This research was conducted using qualitative research methods in order to find empirical evidence. The purpose of qualitative research is to observe and examine to bring forth evidence to support a claim. Leading experts in the field of programmatic advertising were interviewed, one on one, using semi-structured, open ended questions. The interviews were recorded, transcribed and analysed using coding principles and pattern matching. The results of the research were weighed against the hypothesised value chain and expanded upon by drawing a simplistic diagram of the value chain and reported on to support the goals of the research.</p> <p>The results give a clear idea as to what programmatic advertising is, how the process works and how data is manipulated through each step to ensure valid and strategic marketing goals. They show that the hypothesised value chain has been standardised and research supports the thesis question. However, the results also show an expansion of the value chain, depending on which side you look. Data is used throughout the chain and powers the process. There are several steps of the way that require human interaction.</p>	
<b>Keywords</b> Programmatic, RTB, data, targeting, advertising, value chain.	

## Table of contents

1	Introduction.....	1
2	Literature review.....	4
2.1	Marketing.....	4
2.2	Programmatic as a business.....	5
2.3	Big data.....	6
2.4	Agencies.....	7
2.5	Programmatic Advertising.....	8
2.5.1	Introduction.....	8
2.5.2	Evolution of programmatic advertising.....	8
2.5.3	Supply and demand side platforms.....	10
2.5.4	Real-time bidding.....	11
2.5.5	Data management platforms.....	12
3	Methodology.....	16
3.1	Approach.....	16
3.2	Research design.....	16
3.3	Data collection method.....	17
3.4	Data analysis.....	18
3.5	Ethics.....	19
4	Analysis + discussion.....	20
4.1	Analysis / results.....	20
4.1.1	Question 1: What is programmatic advertising?.....	21
4.1.2	Question 2: How does the process work?.....	22
4.1.3	Question 3: What is the difference between programmatic and non-programmatic?.....	24
4.1.4	Question 4: What is data?.....	26
4.1.5	Question 5: How is data used?.....	28
5	Conclusion.....	31
6	References.....	36

## 1 Introduction

“Programmatic media buying and advertising uses a computer program to buy and sell advertising space, in real-time. Decisions are made based on algorithms and software is used to automate the buying, placement, and optimization of media inventory via a bidding system” (McConnell, June 2017.).

Before the purchase and selling of online ad space was controlled by machines and algorithms, marketers would have to be in contact with the buyers and sellers to negotiate and set up a deal to either purchase or sell advertising space. As technology develops so do people’s expectations. We are constantly looking for more efficient ways to make our lives easier. New findings and inventions make tech smaller, easier to use and cut out unnecessary steps through with automation. Automation through technology has minimized the human side in the advertising value chain. Programmatic buying saves up a huge amount of time and makes the process very efficient. The benefits of automation in digital marketing aren’t limited to programmatic advertising; all online media and marketing is slowly but surely making more use of data-driven software to not only cut down on manual labour, but on cost, time and uncertainty.

Programmatic advertising has been evolving for the better part of a decade, combining big data and analytics tools to make smarter, evidence-backed advancements in marketing and business solutions. Data-driven advertising grew a whopping 97% in Finland in 2016 compared to the year before (eMarketer 2016.). According to Zenith’s forecast, over two thirds of all money spent in digital media in 2019 will be traded programmatically and 98 billion dollars will be spent next year (Zenith 2018.). This is a huge amount of advertising budgets focusing on just one type of marketing and is predicted to keep growing each year. The field shows exponential growth each year; eMarketer’s ad spending forecast predicts that over 88% of all advertising budgets will be focused on programmatically bought inventory by 2021 (eMarketer 2019).

The reason this subject became somewhat of an interest to me probably begins with the fact that as far as I can remember I’ve always been interested in marketing. What I’ve found interesting about it on a psychological level is how something over *here* can change someone’s mind over *there*. What is it about an idea that can manipulate someone in to convincing them they want something, find something attractive enough to make a financial decision or planting a seed in someone’s mind.

As my hunger for knowledge grew, I started to research career opportunities that would involve both my interests in marketing and information technology and found data-driven marketing. Because of the research I'd done earlier, I knew that social media was just a small part of digital marketing and that there were several different types and platforms. The main reason I started studying IT was not so much a profound interest in computers but simply due to the fact that I wanted to keep ahead of the curve. Technology is constantly outdoing itself and advancing at a great pace and the rest of the world (and people) are trying to keep up. I wasn't sure what I wanted to do when I finish my degree but I knew that it had something to do with technology. After a long and tedious job search I finally landed myself an internship in digital marketing.

What I find most interesting is finding out how things work and that's really the purpose of this thesis. Anyone can be taught how to push buttons and spend budgets but what influences the most optimal business decisions, in every field of business, is someone who knows how and why they are making these decisions. Digging deeper below the surface and really understanding the process that goes in to data-driven digital marketing will ultimately be the number one thing to further my career. B2C companies that outsource their marketing efforts know that professionals in each respective fields will at the end of the day offer the best possible outcomes. Big data intermediaries, in this case media houses, use analytics and business intelligence tools to process (either a company's own or bought third-party) data to find internet users who are most likely to buy their product and/or services. This is what separates programmatic advertising from non-programmatic. Long gone are the days when you use mass marketing to show advertising to the largest possible number of people and hope that some of them might be interested. Media houses have private deals set up with the top advertising agencies to specifically show relevant advertising to users of their media. The purpose of this research is to gain better understanding of the value chain in programmatic advertising and how big a role data plays in it. Gaining knowledge of this field and data helps me stay atop of the curve.



Figure 1. The Value Chain

Everyone is constantly shown advertisements online, but not many people stop and think about what they're actually seeing, why they see this advertising and how it works. What I'd like to find out through this thesis is the lifecycle of an ad – how when an advertiser puts money in at one end does that turn in to advertising and come out shown to an audience at the other end.

There's been a lot of speculation in the media about how everything we do online is monitored, collected as data and how it is used. Uncertainty creates fear and doubt and, so, through this research I would like to bring clarity to how data is gathered, what companies do with this data and how they benefit from it. What most people don't realise, is that the entire internet is powered and funded by advertising. The purpose of news sites is to bring in as much traffic as possible to show advertising to people. We have to remember, that each ad slot costs something and the more people see advertising, the more the website gets money.

The knowledge gained from this research will help advance my career in programmatic advertising. This research will be conducted through empirical research using qualitative data gathering methods. With a relatively new field in marketing there isn't a huge amount of scientific research done prior to this research and so some information gained is through speculation, observation and examination. These are the core functions of qualitative research. The literature review explains how programmatic advertising came to be, important points that help understand the big picture and hypothesizes the programmatic value chain. The methodology section goes in to more detail about the research process and data analysis. Semi structured interviews were held questioning leading experts in the field in hopes to support the hypothesised value chain and explain the steps of the programmatic advertising process.

## **2 Literature review**

### **2.1 Marketing**

Marketing is a very broad term and covers a wide spectrum of ideas from how customers see a company, their product or services to how a company makes them feel, but at the center of all marketing efforts is one defining pool of people – customers. More so than any other field, marketing focuses on customers. Second to marketing comes sales in these efforts and is why, respectively, sales and marketing often go hand in hand. In Philip Kotler's book (2013, 4) he talks about marketing as being about managing profitable customer relationships.”

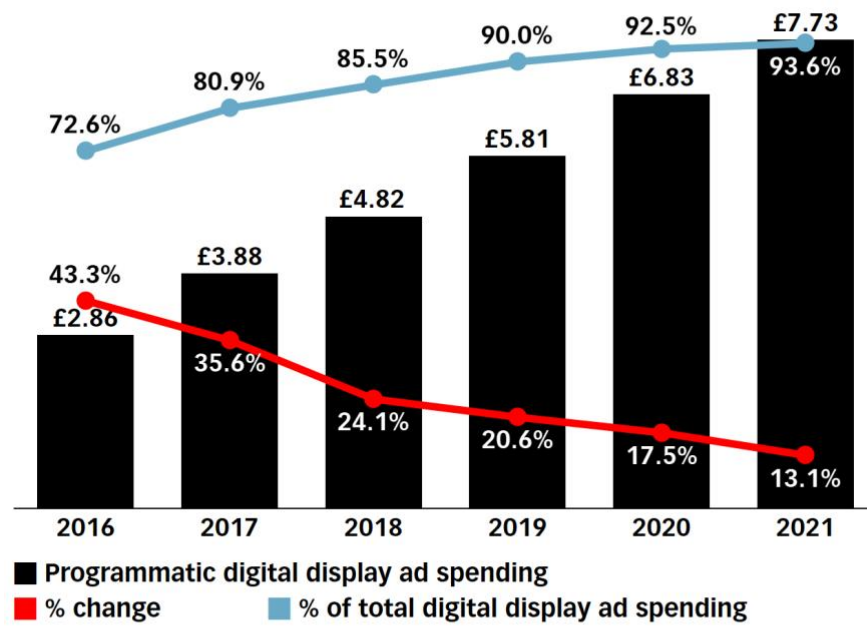
The first appearance of the word ‘marketing’ in a dictionary goes way back to 1897, when it was used to describe the business process of “moving goods from producer to consumer with emphasis on advertising and sales” (Online Etymology Dictionary). Although the channels through which marketing finds itself put through today are vastly different, the meaning of the word has stayed the same. “Advertising is a powerful tool that businesses have used for decades in reaching potential customers to purchase their products or services, as well as reinforcing faith in the business of existing customers” (MDG Advertising 2018).

The evolution of digital marketing runs hand in hand with the rise of the internet and the technological advancements that have come with it. Using machines to leverage business decisions for marketing campaigns yields lots of the same advantages and disadvantages as for example what outcomes business intelligence software has. Within pretty much all fields of business, automation through technology leaves the human side of things to a minimum. The simple fact is that programmatic advertising reduces many of the manual processes ad campaigns would have normally had to go through in the past. No longer is there a need to contact each media separately, as all medias are found using demand and supply side platforms.

Bob Arnold, Associate Director of Digital Strategy at Kellogg's commented on programmatic buying as being ‘more efficient, more effective and more transparent than the traditional digital media buying model. It's more efficient because it's automated and eliminates expensive overhead’ (Gutman 9 November 2012).

## Programmatic Digital Display Ad Spending in the UK, 2016-2021

billions of £, % change and % of total digital ad spending



Note: digital display ads transacted and fulfilled via automation, including everything from publisher-erected APIs to more standardized RTB technology; includes native ads and ads on social networks like Facebook, Snapchat, and Twitter; includes advertising that appears on desktop/laptop computers, mobile phones, tablets and other internet-connected devices  
 Source: eMarketer, October 2019

T10635

www.eMarketer.com

Figure 2. Programmatic Display Ad Spend in the UK, 2016-2021 (Fisher, 2019)

According to Appnexus' 2018 report, over 80% of digital display marketing was done using programmatic advertising and almost 77% of digital video marketing. This is a huge amount of advertising budgets spent focused on this ever growing field. Worryingly, though, the same report states that the 'total viewability for desktop display ads is 53.6%, which means that nearly half of all digital display ads purchased are never seen by anyone' (Appnexus 2018, 6-7).

### 2.2 Programmatic as a business

In order to measure results you need to lay down specific goals in a marketing campaign. Programmatic campaigns typically strive towards viewability, engagement and brand awareness. The purpose of prospective marketing is to arouse interest in the correct user segment, whereas conversion-orientated marketing is supposed to lead the user toward desired conversions. Focus on reach, engagement and valuable traffic are important goals in prospective marketing, while clicks and conversions after seeing an impression are goals to focus on in conversion-orientated strategies. However, there are multiple



factors that play a role in marketing results and you have to look at the whole picture. Programmatic advertising should only be one piece in a marketing strategy, leveraging the use of other digital channels to assist each other within the marketing strategies' attribution model (Interactive Advertising Bureau 2017, 8).

The use of data has completely revolutionised digital marketing. The concept of leveraging actual data from real internet users, analysing the data to find reliable characteristics and using that data to only show adverts to the right people is perhaps the most useful technological advancement to increase sales of the 21<sup>st</sup> century. Before big data analysis and audience segmentation, digital marketing had to rely on demographic factors and user profile information to lead consumers towards desired conversions on a website. Forbes magazine reminds us in an article of the famous quote by John Wanamaker in the late eighteen hundreds, who is often thought of as a pioneer in marketing, that goes "half the money I spend on advertising is wasted, the trouble is I don't know which half" (Bradt 14 September 2016).

### **2.3 Big data**

There once was a time when brands would insert a full page-sized ad in a magazine in hopes that a certain demographic would land on the page and this would encourage them to go out and make a purchase. A good example would be a car manufacturer buying advertising space in Time magazine, thinking middle-aged males would read through the magazine, see their advertisement and this might influence them to buy this car.

Due to technological advancements, data-driven digital advertising takes guessing out of the value chain and replaces it with tangible decision making, leveraging off of big data. Programmatic advertising uses big data to target users who are most likely interested in a product or service. The technology goes as far as letting you show ads to people who are ready to buy. Vast quantities of data are scoured through to segment users into audiences, based on intent, interest, demographic factors as well as their digital footprint. The purpose of targeting consumers using big data is to minimise advertising budget wasted on users who are likely not interested in ads shown to them. Data targeting in programmatic advertising uses cookie data to track online behaviour (Google 2019).

Big data in today's marketing world is proving more and more useful as a key tool to make informed business decisions. As more and more information is being tracked, vast quantities of data is constantly fed in and out of our digital lives. IBM's website introduces

big data analytics as the “use of advanced analytic techniques against very large, diverse data sets from different sources” (IBM 2019). Digital marketing uses big data to show the right person the right ad at the right time. Third party data makes use of a company’s own data (product catalogue, website event tracking and customer relationship management data) to sort their existing customers in to segments and find audiences to target to. Companies’ own data could, effectively, be paired with remarketing data or cookie data to evaluate who are the most profitable set of eyes and specifically show tailored advertising to them. Audience targeting places users in groups based on similar data or characteristics. These segments provide an easy way to target consumers who might be interested in a particular theme, based on demographic data, panel data and online behaviour (Interactive Advertising Bureau 2017, 8).

## **2.4 Agencies**

Agencies are what set the ball rolling in programmatically traded advertising campaigns. An article in the MSG Library compares agencies with tailors, in that an agency “creates the ads, plans how, when and where they should be delivered” (MSG Library 2015). They act as a consultant to their clients in order to produce a “positive picture of themselves to the public” (Cambridge University Press 2019).

As far as the campaign goes, media agencies are in charge of creating the advertisement(s) about a product or service, planning and handling of the campaign (where, when and for how long) and communicate with clients about the campaign (McArthur, David & Griffin 1997, 19-26). Sometimes the ad creatives are outsourced to an advertising agency who’s task it is to create the adverts for the media agency. Media agencies act as the intermediary between their clients and the publisher by purchasing advertising inventory either directly from the publisher or use the auction bidding system (RTB) via ad networks or ad exchanges.

Agencies come in all shapes and sizes and their responsibilities depend on their type of agency. The most common types are full service advertising agencies (FSAA), interactive agencies, creative boutiques, media buying agencies and ones who operate inhouse (MSG Library 2015). Company X could be thought of as an FSAA, even though they either outsource ad creation or creatives come straight from the client. The reason why companies choose to use FSAs, instead of keeping their marketing inhouse, is because agencies are leaders in the field. They have specialists for each functions, like marketing architects, data analysts, programmatic producers, digital media planners and agency trading desks.

## **2.5 Programmatic Advertising**

### **2.5.1 Introduction**

Programmatic advertising refers to the process of buying advertising using software and tools. Because of the use of various sets of programs, the process has been automated, which cuts down on cost, time and multiple manual steps. Technology enables different types of adverts (audio, video, display) to be bought, targeted and optimised in real-time. Programmatic enables purchase of advertising inventory in real time and targeted towards a specific audience segment. The system automatically matches the highest bid auction toward the calculated value of an impression. Segments are created from an advertiser's own cookie data or a third party's data can be used (Interactive Advertising Bureau 2017, 3).

### **2.5.2 Evolution of programmatic advertising**

In order to explain how the programmatic ecosystem works, first we need to understand how programmatic advertising has evolved through time and the reasons behind automation through technological advancements. The earliest form of advertising transactions go back to print media, where advertisers would contact publishers to have their advertisement put in the newspaper for a selected amount of time. The amount of inventory offered depended on the availability of advertising space, formats used and the length of time proposed for the campaign. Digital advertising goes through the very same process at its core, however offering digital inventory through digital means. Programmatic ad buying was originally invented as a solution to a problem a growing number of publishers had.

Advertising sales negotiations typically went through multiple laborious steps in pursuit of conversions and sales. These include contacting leads through calls and email, negotiations, insert orders, contracts and manual tracking of campaigns – and this was done for each media individually. Having multiple tedious steps is very time consuming and allows for human error along the way; or as an article in Digiday puts it “before [programmatic] ad buying, digital ads were bought and sold by human ad buyers and salespeople, who can be expensive and unreliable” (Digiday 2017, 3).

As the popularity of online advertising grew, publishers needed to have a larger supply of advertising space readily available. Advertising campaigns were bought in bulk and to make it easier to calculate the prices of any given ad slots, inventory was given a CPM

price model (cost per thousand impressions). This means that advertisements were valued by each thousand views the ad got. As the amount of ad supply grew, so did the demand for inventory. A case study in the International Journal of Interactive Multimedia and Artificial Intelligence puts it adequately: “the development and popularisation of internet access gave rise to an increase both in the number of publishers as well as in the volume of content these publishers generated” (Gonzalves-Cabanas & Mochon 2016, 6).

As the internet grew, an increasing number of websites and users meant an increased number of advertising market supply. To keep up with demand, supply of inventory grew. This also meant that at the end of the day, there was always going to be unsold ad space inventory. The first ad networks came into play in 1998 and were used to simplify the relationship between advertisers and publishers across a wide range of websites (Kane 29 January 2017). Advertising networks aggregated the leftover ad slots and sold them off for a lower price. When this proved to be profitable, more and more ad networks started buying off the unsold inventories. Unsold advertising slots were bought off much in the same way as stockbrokers bought shares. It quickly became apparent, that it was cheaper to buy advertising from a network than go straight to the publisher (Gonzalves-Cabanas & Mochon 2016, 6).

To differentiate between ad networks, some started also selling targeting audiences. This means that ad inventory could be bought and targeted to specific websites or an audience. Google AdWords changed the game back in 2000 where users were shown ads that were specifically tailored to them – depending on their search terms in Google’s search engine (Kane 29 January 2017).

The rise in ad networks meant that it was able to purchase the same impression from multiple different vendors. These vendors would fight over the unsold inventory using a bidding system. Much like stockbrokers, impressions were sold off to the highest bidder. To compete with each other, ad networks would try and acquire a wide range of advertisers and publishers connected to them. Ad exchanges were added to the value chain due to the fact that it was counterintuitive to purchase the same ad inventory from multiple different vendors. Ad exchanges connected ad networks, who connected the demand side with the supply side.

At first, all ad exchanges were so-called open ad exchanges. Advertisement could now be purchased from multiple medias all around the world through the open ad exchange. Media inventory is bulked together, so the advertiser is never 100% sure where their advertisement is shown or how much inventory is exactly shown (Interactive Advertising

Bureau 2017, 7). The publisher sets the floor price – minimum bid value for each impression and targeting option. The floor price is valued against the demand and supply of inventory. Because of growing uncertainty where, when and to whom the ads were shown, private market places were invented. Private market places are where advertisers and publishers bid privately via exclusive, regulated deals (Interactive Advertising Bureau 2017, 7). This means that private programmatic advertising deals are made between advertiser and publisher and are sold under certain conditions. Inventory is auctioned between a smaller number of advertisers, but there's full control over where the ads are shown and increased brand safety. If an advertiser, let's say Chevrolet, were to advertise a new range of cars, they could negotiate a deal with publishers to not have their ads shown on news pages that bring about a negative light on the automotive industry – eg. car accidents. To ensure greater control, floor prices are agreed individually between advertiser and publisher.

### **2.5.3 Supply and demand side platforms**

Programmatic can be any purchasing of advertising using technologies. Advertising is sold using supply side platforms and bought using demand side platforms. The sell side's platform (SSP) is where ad inventory is placed and sold to the highest bidder. SSPs are used by publishers to present their inventory to buyers by using ad exchanges and networks. Sell side platforms enable publishers to participate in transactions with multiple DSPs and vendors at the same time, all over the world. The buy side's platform (DSP) enables the purchasing of targeted advertising inventory through multiple various inventory sources, which is cost-effective. DSPs offer the purchase types, targeting settings, marketing goals and is where advertisers can track their KPIs. Both platforms are integrated with each other and are where the real-time bidding and floor price models are set. The catalyst between the platforms are the actual Ad Exchanges (Interactive Advertising Bureau 2017, 6).

The display ad creatives are held and operated on dedicated platforms called ad servers. Relevant's product page explains that ad servers are used to manage, store and deliver advertisements on web servers that transport the creative through the internet to be displayed on websites, mobile sites and mobile apps (Relevant 2017). Ad servers are also used for optimization, reporting and other campaign analytics.

## 2.5.4 Real-time bidding

Real-time bidding (RTB) is the most common way to purchase programmatic advertising. RTB is buying advertising impressions that are auctioned in real-time and are purchased individually on a per-impression basis. When someone visits a publisher's website or app, the SSP sends bid requests to the DSP to enter in to the auction of its impression inventory. The SSP decides what the value of each impression is and which impressions are bid upon. After each DSP has bid on the auctioned impression, the system allows the impressions to be sold to the highest bidder. This whole process happens within milliseconds. (New Marketing Institute 2019).

On the advertiser's side, agency trading desks (ATD) are in control of purchasing media within an agency. ATDs use demand side platforms to conduct and optimise programmatic media campaigns. Real-time bidding enables the purchasing of media based on the value of each individual impression. ATDs are able to decide whether or not they would like to bid on a certain impression, based on their value and the targeted audience. As for the publisher's side, the same principal enables them to extract value from their inventory based on the value of each impression. The Econsultancy Online Publishers report explains, that through the use of real-time bidding, publishers are able to significantly increase value of their remnant inventory due to target visitors (Davis 1 February 2016).

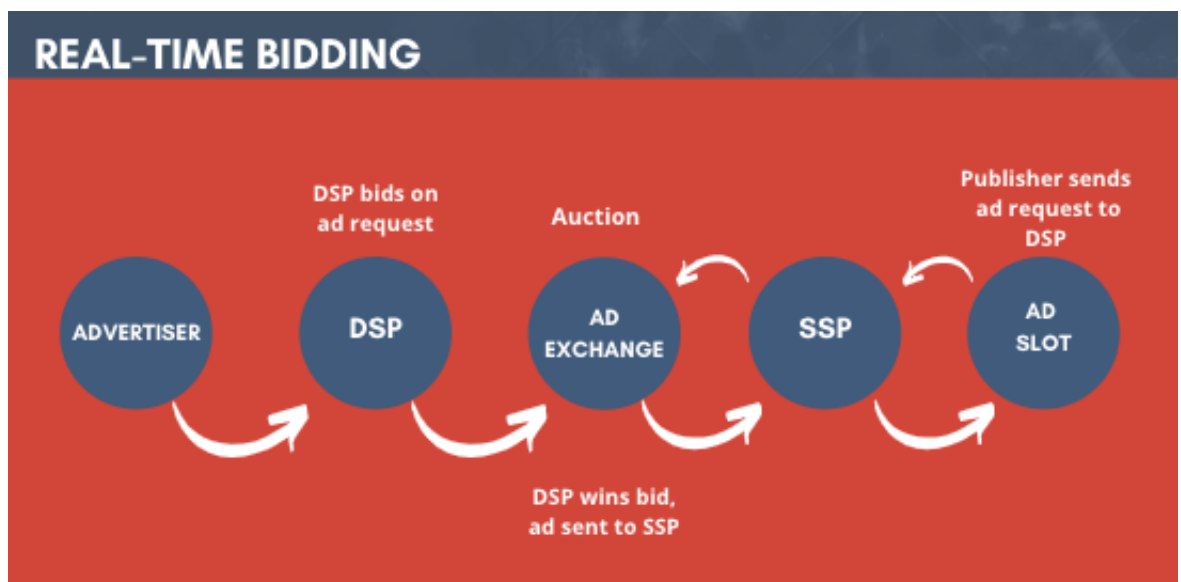


Figure 3. Value chain of real-time bidding

The RTB process begins once a user visits a website or app. The supply side platform receives a notification, that there's an impression available. At that moment, the SSP

analyses all relevant data concerning the user, which can be anything between the location of the IP address, demographic or cookie data – and send it to the ad exchange. The ad exchange notifies the demand side platforms of the available impression and the data of the user using a bid request. The auction begins in the ad exchange and the highest bidder of the DSPs wins. The ad of the DSP that wins is then sent to the publisher and is displayed to the user. According to ClearCode, this process happens within a mere 100 milliseconds. To put this into perspective, the article says that it takes 300 milliseconds to blink (Zawadzinski 23 January 2015).

The auction model used in programmatic advertising in Finland, for the most part, is called second price auctioning. A second price auction is where the highest bidder doesn't pay for the amount that they bid, but the price of the second highest bid in the auction, plus one cent. The auction itself is based off of a sealed-type auction mechanism called the Vickrey auction, where the bids are placed without knowing what the other bids are (Ausubel & Milgrom 2006, 2-6). The first price auction model, however, works in the way that each bidder pays the exact amount of the bid. For obvious reasons, publishers would prefer the first price model.

### Second Price Auction Model



Figure 4. Second price auction model (New Market Institute, 2019)

#### 2.5.5 Data management platforms

Data management platforms purchase data used in targeting segments and audiences from data suppliers, which is analysed and utilised to create customised targeting audiences. Google's DMP's patent explains that their data management platform consists of a data integration processor for collecting data from providers and that they need to perform validity checks to make sure the data is secure. An analytics processor is used to validate the incoming data and is presented in "SQL-like query language via a library of

data mining methods” (Google Patents 2019). DMPs not only work as online data marketplaces, but also facilitate the data as a warehouse for future use. This is where advertisers are able to make use of third party data in order to perform optimal audience targeting. Big data is fed in to the platform and generally, a DMP specialist is appointed to sort and analyse through these vast datasets. Evgeny Popov, who is the vice president of a global data management platform, told AdNews in an article that he would have data management platforms be the “backbone of data-driven digital marketing” and goes on to emphasise that they are specifically used to “collect, organise and activate first and third party audience data.” The validity of data vendors and their services are what cause most anxiety when it comes to purchasing data from separate data suppliers. Popov goes on to say that the greatest challenge a DMP business faces is being able to trust the data source and finding the right data to fit the marketing goals of a campaign (Chambers 2 July 2018).

Nine times out of ten, first party data is going to be the most effective in achieving those goals. First party data is data a company has collected themselves from their customers and users who have visited their website or app. This information is gathered through cookie data, customer relationship management (CRM) data, offline data or business solution and analytics tools. First party data is, by far, the most valuable to a company as there’s no question about the quality or validity of the information. First party data allows a company to create custom audiences that focus on their existing customers’ online behaviour. First party audiences already know the company’s product or services and this information can be leveraged to lure customers to return to the website or app. Through customer online behaviour tracking, companies are able to retarget these users via the use of cookies (Lotame 2019). This is where, for example, you would see an ad for those Nike shoes you checked out on Amazon – when you visit a different website. Leveraging cookie data works by placing a pixel on a website that is triggered each time a website is launched. A pixel is a small piece of HTML code that is placed onto the site and when it is triggered, it drops a cookie into the user’s browser. The cookie itself is a text file that lives in the browser and makes records of how a user behaves on a site. An article on Digitaland explains that user behaviour on a website triggers “a request to the server to download a tracking pixel attached to the content they’re interacting with” (Digitaland 2017).





Figure 5. Value chain of tracking pixel (Digitaland 2017)

Pixels are most commonly placed on a website's homepage to track who's visited a company's site, on product pages to see who might be interested in a certain product or on to a conversion page to let advertisers know who has already converted. Conversion pixels are a great way to exclude existing customers from segments where you're trying to reach new customers. Pixels are also what tracks who's seen and who's clicked on display ads.

Second party data relies on the acquisition of someone else's first party data or leveraging someone else's first party data to gather information about users. Joni Castorino from Oracle explains, that this data is not publicly available for purchase, but is rather gained from a strategic partnership (Oracle Data Cloud 7 October 2016). Publishers, like Alma or Sanoma in Finland, could create segments using their own first party data and allow other companies to use these segments for better targeting. Another example is when a company uses Google Ads for keyword or display advertising, the company essentially uses Google's first party data that Google has gathered from their users and allows this organisation to use their data for targeting. These segments are as reliable as first party data and can be layered with third party data for both reach and quality. Second party data is essentially everything that's not first or third party data.

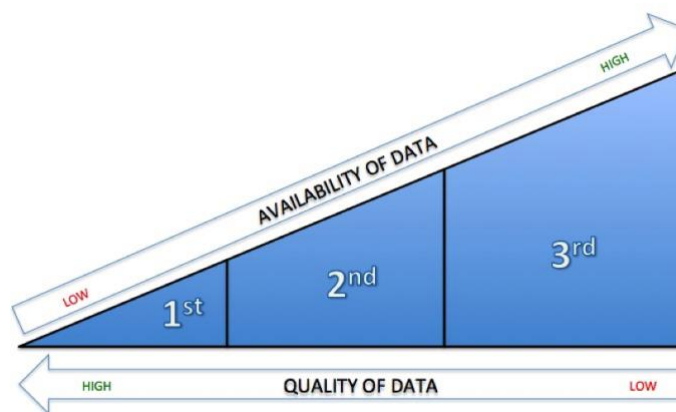


Figure 6. Data quality and scale (O'Hara 25 January 2016)

Third party data, as opposed to first party data, focuses on new customers and is information gathered through several various sources. The data is analysed, sorted through and aggravated to make audiences, which can then be sold onwards. These audiences are created by analysing users' online behaviour, contextual and demographic data to create segments based off of probable user interest and intent.



Figure 7. 1<sup>st</sup>, 2<sup>nd</sup> and 3<sup>rd</sup> party data (Ackley 3 July 2014)

Third party data isn't as reliable as the other two, as you don't know for sure what the audiences are made from and what data was used to model these audiences. Publishers often offer third party data, but you're not sure what attribution models have been used to determine these segments. The quality of third party publisher data varies; just because users read a car-related article on Iltasanomat, doesn't mean they're interested in buying cars. Another issue with third party data is that it's usually obtainable by anyone and that means competitors are most likely also using it. Competition makes data supplier prices rise. Studies show that programmatic advertising targeted using behavioural analysis to create behavioural segments are much more efficient in reaching the right audience (Ozcelik & Varnali 2018).

### **3 Methodology**

#### **3.1 Approach**

Angelo State University defines empirical research as “principles and procedures for the systematic pursuit of knowledge involving the recognition and formulation of a problem, the collection of data through observation and experiment, and the formulation and testing of hypotheses” (Angelo State University). Information is gathered through observation and experience to find answers from empirical evidence. Empirical research is either done using qualitative or quantitative research methods. The quantitative research method observes information gathered using statistical and mathematic data to support empirical findings, whereas qualitative research acquires data from a narrative and finds its evidence asking how and why questions. This type of research places emphasis on the human elements of the social and natural sciences (Given 2008, xxix).

The research was conducted using a qualitative method, to see whether or not the findings support the hypothesised value chain in programmatic advertising. Qualitative research results are commonly presented in a descriptive manner, which allows the empirical evidence to support the thesis question. In order to get the most value out of the interviews, it was imperative that the questions were open-ended and could not be answered with a simple yes or no answer. Qualitative research doesn't rely on large sample sizes, so a relatively small sample of programmatic experts were chosen for the interviews and they were conducted one-on-one. Data was gathered by asking what, how and why questions through semi-structured interviews. The interviews were rather unstructured to allow free-flowing discussion and to explore different topics as they came up.

#### **3.2 Research design**

The purpose of this research is to find information about the value chain in programmatic advertising, the advantages of this type of marketing, what specifically is data and how it is used to benefit marketing strategy.

A research design describes the systematic method in to how results to a research are discovered. There are three categories of research design: exploratory, descriptive and explanatory research. Exploratory research seeks to find a deeper understanding of a subject, descriptive research describes a phenomenon based on data and explanatory

research explains relationships between variables (Given 2008, 325). Descriptive research is quantitative in that it uses mathematical data and doesn't allow for open-ended questions and thus, isn't used for this research. This type of research is both exploratory and explanatory in that the purpose is to explore the idea of a pre-existing value chain in programmatic advertising and use the results of the study to explain how the process works.

Explanatory research is used to "identify the extent and nature of cause-and-effect relationships" (Research Methodology, 2019). Exploratory research is used to evaluate the effect of the value chain in programmatic advertising, by analysing patterns of relationships between variables and clarifying its concepts. The interviewees were selected due to their vast knowledge about the subject and assist in providing understanding and validity of the process. The purpose of this kind of research is not so much prove a point, but to help bring a deeper understanding to the subject. Results will be analysed in hopes to bring new light on the subject, to bring depth and understanding to the value chain and possibly offer prospect of future findings.

Ontologically, this research is subjective and epistemologically interpretive. It is based on words from a small sample of individuals as opposed to a large survey producing numbers and statistics, and my own interpretation of what is being said, and my own interpretation of that data in to a conceptual model.

### **3.3 Data collection method**

The primary data collection resource is through interviews. The interviews were pre-planned, in that a question protocol was conducted prior to the interviews with planned questions at the ready.

Programmatic advertising is a relatively new field and although there's a lot of blogs about the subject and it's somewhat a 'buzzword' when it comes to representing new and exciting things in marketing, the term is a bit of an umbrella term and there isn't a vast amount of credible sources discussing the subject. As per my job, I have an advantage here as I work in the same space as some of the most seasoned experts in the field in the country.

The first person I sat down with not only has one of the longest careers in programmatic advertising in Finland, but is actually the very first person to introduce the country to the programmatic advertising field. The second person I interviewed leads the programmatic

team at Company X. I thought it would be interesting to get an all-round insight of the field, not only from the most experienced people, but also from novices in the field. The third person that I interviewed has been in programmatic for almost a year and helped me get a view from someone who has an understanding of the field, but has a new look on the subject. I figured sitting down with these people and having a chat about programmatic advertising would be the best way to get an inside view on what it is and how it works. As my key research objective for the purpose of the thesis was to break down the value chain process, I focused my interviews around that. The secondary data collection method is through online research papers, scholars, websites, databases, forecasts, reports, blogs and videos. As there isn't much in the form of proper studies on the subject that would've been relevant to this research paper, instructional websites, blogs and videos were also considered for the collection of information presented in this research.

### **3.4 Data analysis**

I prepared for the interviews by writing down interview questions. It was important for me to get as much information as possible about the subject, so I deliberately only asked open-ended questions. It was also important for the interviews to follow a certain flow, so I gave a lot of thought in to the structure of the interviews – the questions could be asked one after the other no matter the answers and still maintain the same train of thought.

The intention of the questions were to give a really well-rounded view of the field. The idea was to get rather long answers from short questions, leaving them to do most of the talking. I structured the interview protocol to give answers to what is programmatic advertising, how it works, why would you use it and the importance/leverage of data.

I set up meetings with each interviewee by booking an hour's slot out of their calendar and booked a room to record in. The interviews were recorded using my mobile phone. To get the ball rolling and avoid the awkward chitchat, I started each interview with asking them about their role in the company and how they got where they are now. The interview questions were written on to Evernote on my laptop, which sat open next to me on the table. During the interview, I also took notes and jotted down some key points from the answers. This allowed for me to already have a good set of answers written on bullet points and let me jump back to the intended flow when discussion ran off-course.

As I wasn't particularly seasoned in the field myself, and the purpose of the interviews was to explain the value chain process from the buyer's (advertiser's) side, I made sure to

grapple on to each new term and specifically ask my interviewees to explain what each term meant. After they had explained the terms, I pursued to lead the conversation back on track by using my notes.

The interviews were in Finnish, so I transcribed the interviews and translated them as I went along. Not every sentence was relevant, so what I did was picked out the key sentences and transcribed/translated to work on later. Using my transcriptions and notes I analysed the answers to find what I was looking for.

### **3.5 Ethics**

Due to non-disclosure agreements, brand safety and company hygiene, the names of the interviewees and company are not presented in this study. Furthermore, all examples of brands mentioned as examples included in this research are real life examples of known brands, however the names of these brands have been changed to similar brands of comparable stature. The company is represented as 'Company X' and the interviewees are labelled 'Interviewee 1' and so on. All interviewees have given permission for the recording of their interviews.

## 4 Analysis + discussion

### 4.1 Analysis / results

Analysis of research content was done using semiotic analysis. It was imperative to look for themes, frequencies of words and phrases to pattern match different aspects of the interviewees answers and use combine a well-rounded analysis. Interviewee answers in semi-structured interviews often go off-course, so it was important to be able to match the question with the answer and this was done after the interviews using coding mechanism with translated transcriptions, the recordings and the notes. The analysis is written in a simple and clear way for reader of research to clearly understand what's being answered and where. Below is the outcome of pattern matching in form of an analytics grid.

Question	Interviewee 1	Interviewee 2	Interviewee 3
What is PA?	Buy ad space using software & technology Automation Social media	Buy inventory with machines Social media Data driven	Buy digital advertising Automation Data driven
How does the process work?	Use DSP to buy Connect to SSP & AdEx. Ad fraud RTB process	RTB is standardized Ecosystem Depends on strategy Vickey auction	Standardized across platforms & formats RTB / auction 3 <sup>rd</sup> party data
Programmatic vs. non-programmatic	Direct Is more expensive Is useful to publisher Not real time, can't optimize All medias separate	Skips auction part Priority (more valuable) Useful when set period Publisher in control No optimising	Direct = less control Direct gets first priority Useful when set period Can't affect after starts
What is data?	Selling data Not all data is valuable Relevancy / validity Mass on all websites	Big data: targeting, analysis, optimization, BI CRM: targeting	
How is data used?	Online behaviour / cookies No personal info Big data: lots of it Targeting / segments Don't over do it	Data used in every step of PA process 1 <sup>st</sup> & 3 <sup>rd</sup> party data Cross device / cookies	Cross device / location Cookies / remarketing

Table 1. Analytics grid

#### 4.1.1 Question 1: What is programmatic advertising?

Interviewee 1 answers the question by stating that programmatic advertising, simply put, means “ad space buying using software and technology.” However, he would like to make it clear that this doesn’t mean that the whole process is automated. “The entire value chain consists of multiple various steps in which you still need human interaction. Automation takes place in the steps between the buyer and the seller (sales, impressions, conversions). Humans take care of setting up the campaign – called trafficking (inserting all the details in to the software) and optimization.”

Interviewee 2 similarly defines programmatic advertising as a means of buying ad inventory with machines using automated processes and data. By this logic, he goes on to say, Facebook Ads could also be classified as programmatic – but isn’t because it falls under the “social media” category. All three interviewees agree upon the fact that social media advertising is also highly programmatic in how the value chain mechanisms work. Interviewee 3 goes on to explain that there used to be a Facebook Ad Exchange, which was widely considered to be the most effective Ad Exchange of its time. It was very effective because people have their guard down when using entertainment. Facebook advertising is very similar to native advertising – they look the same. The main reason why it was shut down was because Facebook wanted this traffic to only happen on Facebook. This is generally the same reason why Google has made purchasing of YouTube Ads only available on Google platforms and Amazon Ads only on Amazon.

The interviewees’ answers agree with the literature in that they would all describe the phenomenon as using technology to buy advertising inventory through data and automation. On the other hand, their answers go against the literature where the divide between human and machine draws from. The literature implies that machines do most of the work, however the interviewees answers indicate that humans operate quite a large quantity of the process. Shedding new light on the matter is how social media can also be considered in the same field, as their too advertisers buy digital media using machines – only for a single platform. The sheer extent to what media can be bought programmatically extends from the simple desktop and mobile screens all the way out-of-house (OOH), as interviewee 2 suggests that in the future, it’s very likely that digital media could be targeted through weather, location or time data on billboards, bus stops or inside shopping centres on JCDecaux screens.



#### 4.1.2 Question 2: How does the process work?

Interviewee 1 explains, that the buyer controls purchasing of ad inventory using a demand side platform, which connects to the Ad Exchange, which runs through to the sales side platform (SSP) where sellers hold the ad space. "It doesn't matter which SSP you use, as they are all connected to the same Ad Exchange". He then goes on to explain that data travelling through this many programs has its challenges and gives access to issues like ad fraud. Data security concerns are held at the topmost priority with most of the global leaders of DSPs, SSPs and Ad Exchanges and try their best to prevent ad fraud, security breaches and data getting lost along the way. It's important to point out, that it's likely the data might travel through third party software/companies and that's why you need a good, solid contract with safe parties you can trust. The ad exchange is looked over by the ad exchange's own personnel to make sure it operates in an optimal manner. On the SSPs side, each website that might show an ad needs to be screened to know they're safe and don't use the data for fraud. This is precisely why many companies would prefer to use predetermined deals in a Private Market Place, instead of the Open Market auction.

Interviewees 2 and 3 answer the question through the ecosystem of programmatic advertising and both agree on the real-time bidding (RTB) auctioning method being at the centre of the value chain. Interviewee 3 points out, that real-time bidding is "only one mechanism of ad buying and how this works is each impressions is bought for a minimum price according to stock/inventory." All three interviewees state that the RTB process is standardized and is pretty much the same across all platforms and formats. Interviewee 2 explains, that "for example video platforms deal with videos but the value chain of the auction will be the same as any other programmatic process." The evidence shows that demand side platforms vary in tools and often multiple are used at the same time for optimal results.

Interviewee 2 goes on to explain the programmatic ecosystem process in more detail. He states that the "process begins when a customer briefs the advertiser of the intended marketing campaign and the advertiser (media agency) makes the ads for the customer. The media agency send the campaign material to the agency trading desk (ATD), who uploads the material on to the ad server. The trading desk sets up the campaign within the DSP and uses the platform to engage ad networks and/or the Ad Exchange with the trading process. They will at this point choose to use on of the trading methods: open market, private deals or programmatic guaranteed. The Ad Exchange, at this point, goes to work connecting to the publishers SSP to engage in the auction for their advertising inventory."

Interviewee 2's answer directly reinforces the hypothesised value chain described in the literature review part of the thesis. From this explanation we also get a strong sense of what Interviewee 1 was talking about in the first question – of how much people still do the work behind the scenes. Interviewee 2's description of the programmatic process not only strengthens the research, but also magnifies information that the literature review doesn't. The answer is an interesting addition to the findings in that observations suggest there could be more room for automation in order to lessen human responsibilities of the value chain.

Interviewee 3 adds to this by saying that “it all comes down to the marketing strategy. If impressions (ad views) are what you're after, then first you would need to define which targeting method you want to use to reach the target audience (eg. users who are interested in cars).” He explains using an example in practice, that “users who have been to automotive sites (i.e. Nettiauto, Tori or Oikotie) are added to a targeting pool of similar users with similar online behaviour. After these users leave the car-related site, they might go to a publishers' website (eg. Helsingin Sanomat) and be shown car-related ads.” This means, that DSPs categorise users and know what they're interested in even before they enter the website. Interviewee 3 further explains, that upon entering the publisher's website, as the page starts to load, the real time bidding auction begins. “Whoever wins the auction gets the opportunity to show their car-related advertising to this specific user. Within milliseconds, the system notices that this user has potential and we want to show these ads to this user. The auction begins and the highest bidder wins the auction and the user gets shown ad from the highest bidder in auctioned inventory.”

What interviewee 3 has explained is a step-by-step process model of how the RTB works and given real life examples to put in to context. This information is highly valuable to the research, as secondary data only explains the process on a technological level. Interviewee 3's answers not only expands on the literature, but also gives relevant context to the subject at hand.

At this point of the discussion with interviewee 2, the interview gets a little off track and we begin talking about alternatives to the standardized process. He clarifies that in Finland, what pricing model we use is the 'second price auction', however this is not the case in all parts of the world. The discussion drifts to ways in which the value chain could be better and interviewee 2 has a suggestion. He expounds the theory, in that the second price auctioning method is not a great system for the seller's side and the first price method isn't great for ad buyers – so he says there should be something put in between that is

beneficial to both sides. First price auctioning is when you actually pay for what you bid. Publishers would prefer this method, as they would be granted more revenue. This is an insightful expansion on the literature of the research, as what is stated is the auctioning model, but not why we use it. Interviewee 2's idea gives an interesting idea for future research.

#### **4.1.3 Question 3: What is the difference between programmatic and non-programmatic?**

Interviewee 1 opens the discussion by mentioning another way of purchasing digital media inventory: directly. Direct media buying is sort of the precursor to programmatic media buying. He describes it as being "a very manual process that consists of contacting a publisher individually, proposing an offer (impression or viewability-based), which uses a single media and has a fixed benchmark price. More often than not, direct media buying is more expensive than programmatic." Interviewee 2 and 3 give very similar answers about direct media buying. The idea is that you can purchase a certain amount of impressions for a certain time period – and so these impressions are guaranteed to happen. The buyer, in this case, has no control after this, as the publisher is in full control of the campaign. Interviewee 3 thinks that "this isn't very optimal, as there is no optimisation, no real time analysis or results and you can't make changes to the campaign on the fly. The advantages of direct media buying are mostly seen on the seller's side as they make a guaranteed profit and thus are the top priority for publishers."

Interviewees 1 and 2 give similar descriptions to how direct works in theory and the pecking order of ad inventory. Interviewee 1 states that "as a website launches and auctions begin, direct purchases of inventory get the top priority to be seen." Directly bought campaigns are still useful particularly during select seasons like Black Friday, Christmas or other such on-sale offers. Interviewee 2 goes on to state that publishers have various ways of controlling their inventory and are prioritised by purchase method. "When you go on a publishers site, directly bought media has first serve, as they are most valuable to publishers. Second is programmatic guaranteed, which is basically direct media bought programmatically. Third is the programmatic adverts auctioned at private market place are shown and lastly those from the open market."

Another useful insight in to the value chain is added during the aforementioned answers concerning direct media buying, as this was only briefly discussed during the literature review and wasn't presented as noteworthy enough to be given a second glance. What these answers teach us is that, even though the value chain looks clear from the outside,

there are several nuances to the process which are only given light to through expert experience. An interesting acumen to the research is the fact that even on the publisher's side, not all advertising inventory purchased is treated equally. Not only is it fascinating to know that direct ad buying is given first priority on publisher's sites, but also very useful to keep in mind when evaluating marketing strategies.

Although the marketing landscape is slowly shifting towards widespread programmatic campaigns, Interviewee 3 enlightens on other direct media buying benefits. He goes on to explain that directly bought media might be more useful when there is a certain set time frame for a campaign and it's important that a certain amount of ad impressions are guaranteed from a major publisher (eg. Christmas or Independence Day). "Sometimes you can negotiate a better deal with the publisher and purchase these set impressions for a cheaper price than normally. Again, with a good enough deal, the cost per conversion might be better than that of in a programmatic campaign."

All interviewees' answers agree with each other on the facts that at the end of the day, with directly purchased media you hand over all the control to the publisher, you don't know who sees your ads or how many times a unique impression is tracked – meaning how many times the same user sees the same ad. The reason programmatic traders would like to avoid purchasing inventory directly is that you need to purchase directly from each media, separately, so if you'd like your ads to be seen in other medias, you'd have to make similar deals with each. Interviewee 3 states that you run the risk of a showing the same person the same ad at a very high frequency. "Say each media shows the same ad to one user 5 times, through 5 different medias, which means the same person sees the same ad 25 times. This is annoying and not very cost efficient."

When leading the conversation back to programmatic campaigns and the advantages that non-directly bought media campaigns bring, interviewee 1 discussed the number one frustration all programmatic traders face at some point in their careers. "What can be the most frustrating aspect is that you have all these great technologies to use that are cost efficient, you have so much control, you have all this data to use to target the right users – but if the actual display banner advertisement itself is not good, then the whole pyramid falls apart." If the actual advert itself is poorly planned, is not appealing or it doesn't stand out, then people won't notice it. "You have a very tight window of opportunity to capture the user's attention. This is a subject that is rarely discussed, but at the end of the day it's the advert that captures the attention, not the purchase mechanisms. Advertising companies should stick to the basics – big text and bright colours."

Interviewee 2 and 3's answers to the advantages of programmatic advertising mirror each other in that they both agree that automation of the marketing landscape has made digital advertising much more effective, more efficient and has cut down on time. The 'real-time' aspect has opened up numerous possibilities, as now you don't have to conform to a certain pre-set budget or time. All three interviewees discuss how programmatic advertising has opened up the capabilities and control over marketing campaigns. "There's no need to wait until the end of the campaign to see results, as it all happens in real time. If you see that a campaign could be performing at a higher level by making a tweak after day one, it's completely possible to make changes on the go."

Interviewee 2 goes on to explain, that the benefits of real time control don't stop at the campaign level. "Creatives can be tested against each other to see which ad works better than the other, which ad works for which target group and which are most fruitful." He gives an example "let's say you run a veterinarian practice and propose you had three different ads with the same slogan. One ad shows a car, the second a dog and the third a baby. Chances are, the dog-themed ad will be more relevant to pet owners." This is only a theory, but could be measured and analysed, in real-time, using programmatic advertising metrics and analytics. This would confirm that one ad set works better than the other two and proves to be a vastly cost efficient way to meet marketing KPIs. Interviewee 1 discusses another useful strategy, that programmatic traders use, in which you would compete segment audiences against each other, much in the same way as the ads, and focus the remaining of the marketing budget towards the target group with most optimal results.

#### **4.1.4 Question 4: What is data?**

The conversation begins in a general sense of what kinds of different data there is and on the subject of cookie data, interviewee 1 talks about how data suppliers have cookie data, it can be sold onwards. However, not every cookie is as useful as another cookie. Data can be purchased straight from the media/publisher (eg. from Alma – Iltasanomat data, or Sanoma – Helsingin Sanomat data), through various online stores, from price comparison sites (which is very valuable), research companies who have panel data and other data retailers. Because of the GDPR elephant in the room, it's vital to make sure what data is allowed to be sold on, which data doesn't breach any laws and which do not contain personal information. Interviewee 1 states that the amount of data and the relevancy of

data are two very different things. Just because a big media publisher has a lot of data from its readers doesn't mean that this is necessarily relevant or even trustworthy data. Two major players of Finland's media landscape may have a vast amount of visitor data from everyday news readers, but they cater to the masses and, thus, haven't got very accurate data segmentation. Just because a user has read car-related news doesn't always mean they're interested in cars – they can just be interested in the news.

Interviewee 3's answers agree with interviewee 1's, as another factor to take in to account is that "these medias try and get as many people on to their site/apps as possible". He explains that this is done through catchy headlines and clickbait. Even so-called niche newspapers like Kauppalehti, Vauva or MeNaiset that cater to people who are interested in a certain subject, at the end of the day, try and get as many website views and visits (impressions and clicks) as possible. The simple truth is that all media is funded by the advertising inventory sold on these sites and the fact of the matter is – more visitors means more money.

Both interviewee 1 and 3's answers about the validity of data adds to the literature, as this isn't a hot topic when it comes to how data is used within the programmatic advertising value chain, although it is relevant. This is why relevancy of data is so important. This issue supports Popov's anxiety about data relevancy in the literature. Online store data or price comparison site data is usually much more relevant, as these users have intent and are actually interested in the products that they search.

Interviewee 2 jokingly says that all data that doesn't fit into excel is 'big data'. The fact of the matter is, that data has become such an umbrella term – and data might not be data. Company X uses big data to use for targeting, analysis, optimisation and business intelligence just to name a few. What company X does, is sets each individual marketing campaign with its each campaign ID. All these campaign IDs are used to draw campaign data from and is fed onto a dashboard by data scientists using what is called campaign mapping. This allows marketing strategists to use AI and big data analysis to make valid decisions concerning marketing strategy. Advertisers use customer management data (CRMs) and product databases through the use of big data. This big data can be integrated on to DMPs to use data to segment existing customers and targeting.

#### 4.1.5 Question 5: How is data used?

Interviewee 1 explains that data is gathered from user online behaviour, simply what they do online, and this is done using cookie data. Cookies are bits of data stored in web browsers to let websites know if a user has visited a site before and what they did on that website. This cookie data gives each user an identification number or browser ID and lets advertisers place users in pools for remarketing purposes. Interviewee 1 would like to note, that it's important to remember that cookie data doesn't store any personal information, so each user/browser still stays anonymous to advertisers. The change in to GDPR laws make many question gathering of user data, however is not relevant when it comes to remarketing principles.

Interviewee 2 stresses the importance of data in data driven digital marketing. It's the engine that powers the marketing of today. He adds that data is used in every step of the ecosystem. Advertisers and media agencies use data to plan out the entire marketing campaign, optimise and analyse results. The trading desk uses data for targeting (from vendors/data suppliers). The DSP makes use of data from multiple data platforms, most notably from a DMP (data management platform), but also from social data tools, various data suppliers and / or data exchanges. Rather than third party data suppliers, also first party (own) CRM data is used. Publishers might also have their own data from their own DMP. Outsider data vendors also sell data for targeting purposes (eg. new car owners).

Interviewee 3 answers along the same lines as interviewee 2, in that big data is highly relevant when it comes to programmatic advertising, as the sheer amount of data stored is vast. He goes on to say that websites gather a list of every interaction/event performed on a site by each user and is classified under cookie/device/browser ID. From this data you filter, for example, users who have been on a certain URL and have a relevant segment of users who are already familiar or at least aware of the company. How this works in practice, is user X has read formula-related news 5 times in 1 week – so we can assume this person is interested in formula racing. Then you would place users who have similar web interactions in a group to get a valid and purposeful target group. This is how 90% of segments are found. Now say you take this group of formula-interested users and you search through the big data to find other characteristic similarities of these users and you can either make presumptions of what else they have in common or you can use this data to exclude from other segments to get a more accurate result.

All three interviewees have explained the very base of segmentation as thought, that you would usually find demographic data on users who have participated in online surveys or

panel groups, where they have provided information about themselves like their age or gender – have a look at how they use the internet and make analysis based on their online behaviour to find other users who use the web in the same way. This is how demographic segmentation works.

Interviewee 3 adds, that location based segmentation is much easier, as you only need to look at a device's coordinate data – where and when a certain device has been used. This is also how we're able to match a single user on several devices, called cross device targeting. If two devices seem to travel the same routes each day and are used in the same places in relatively similar ways on websites or apps – it's easy to assume that the same user is using both these devices. Through location services we know what is at these coordinates – called geo-fencing. As an example, interviewee 3 uses a McDonald's store. Using a device's coordinate history data we can assume user behaviour – say someone visits a McDonald's five times in one week. Note that this might only be on their route to work and not have them actually enter the store – so this is not a perfect guess.

What's interesting is that the answers make data sampling sound a lot easier than it actually is. Interviewee 1 states that building target groups and segments through the use of data gathering and analysis works as a trial-and-error type process through changes to segments to accumulate better understanding and more accurate guesses. Sorting through big data is actually quite a tricky process and the relevancy of the target groups lie in the capability of understanding the data in the first place. Users are placed in segment pools of users who are alike in ways and users who are not alike in ways. These pools are compared and other pools are used to either match with to fine-tune the results or exclude from other pools to divide to smaller segments and find the right audiences. Data is used from other segments and (reliable) panel data to create new segments. As a practical example, let's say we are trying to find a segment audience resembling family mothers; we would take audiences that are interested in quick meals, we would use demographic data to find a relevant age group and combine these with an audience who have frequented family-orientated websites.

Interviewee 1 would also like to point out that even though finding the right audience from vast amounts of big data, dividing it over and over again to find a very niche and difficult to find user group may seem relevant, this is actually quite counterintuitive. When you have a tiny sample size of users it's true these might be the most relevant users that serve a purpose, however this is just wasted marketing efforts. It's important to keep a targeting pool just large enough that you don't cut out potentially valid leads / conversions in hopes to find the perfect target group.



Their answers agree in the literature in how targeting works using first, second or third party data. However, the answers give us a valuable insight into the granular process. The research has opened up how the process works in reality and gives us an idea of how to put it in to practice. An important bit of information is the fact that no personal information is gathered, stored or used within audience segmentation, as targeting data comes from users' online behaviour. Another interesting point is to hear that segments are adopted by analyzing pre-existing segments and excluding factors that we know to be true and want to exclude from a segment to make it more accurate. The literature give us an idea of how much data is used within the value chain, nonetheless the answers confirm and support this.

When it comes to targeting, interviewee 3 thinks the best tool set a programmatic trader has is remarketing. "Remarketing is advertising targeted to users who have already visited a website. How it works is you place a remarketing pixel on to an advertiser's website and it fires every time the website launches. A tracking pixel is a small piece of code that fires up when a website is opened and is used to keep track of users who have been on a site or interacted with a site." If you visit Zalando's site to look for trainers, for example, then you're added to their remarketing list and through the use of cookies you might see then Zalando's advertising on other websites you visit trying to refer you back. Cookie data is stored on a user's computer and allows websites to identify each unique user as an individual, without the use of personal information. Cookies allow traders to analyse and measure the success of a remarketing campaign based on user behaviour online. The real question is how many conversions have not due to remarketing.

This supports the literature in what a cookie is and how it is used but what this adds toward the literature is, again, how you would use this in practise. The answer also informs us how traders benefit from this use of data, something that we haven't learned from the literature alone.

## 5 Conclusion

The rationale for starting this research was to get a better understanding of programmatic advertising value chains, the role data plays in the ecosystem and how it is utilised. Data-driven digital marketing is a quickly expanding field that plays a central role in our ever-evolving, tech-driven lives. As more and more of our lives involve screen-time, I think bringing light on how companies use our focus on screens to their advantage and it would be beneficial for anyone who spends time on screens on a day to day basis to learn what happens behind the curtains. Through this research I hoped to get a closer look at the advantages of this type of marketing, what specifically is data and learn how data powers the engine of marketing as it is today.

The research was conducted through the use of empirical research, where information is gathered through observation and experience. A qualitative approach was implemented to find evidence that supports the hypothesised value chain in programmatic advertising. This was done by interviewing leading programmatic experts from Company X, via semi-structured interview sessions recorded individually, following a pre-set interview protocol. Questions were open-ended to avoid short yes or no answers, in order to demonstrate knowledge and to gain as much insight as possible. Interviews were held in Finnish, which were then transcribed and translated in to English. Notes were taken during the interviews to cross analyse with the transcriptions and enhance pattern matching during analysis.

The interviews were very insightful and brought a deeper understanding to the subject. As much as the literature gave a good picture in to why programmatic advertising is set in a single, step by step process, the interviews expanded upon the value chain by giving real-life examples and understanding why the process works in the way that it does. The information gathered during the research was vastly beneficial and validates the hypothesised value chain.

The research was successful in bringing new knowledge to the programmatic ecosystem in a way that couldn't be learned from the literature alone. Gathering information from experts in the field helped not only confirm the pre-existing, standardised process, but also helped me understand why each step of the process works in the way that it does.

The first research question asks the interviewees what they think programmatic advertising is. All three interviewees' agreed that programmatic advertising, at its core, is

a way to buy ad inventory using data and machines. The literature already states this, however we learn through the interviews that not as much of the process is automated as you'd think. There's still a number of human steps that go in to the value chain that the process needs in order to function. Humans take care of setting up the campaign, which is called trafficking, optimisation and analysing the results of the campaign.

The second question goes a step further by asking the interviewees to explain how the process works. The answers agree with the literature in that they follow a standardised value chain, however their answers explain just how much goes on around each step. Data is manipulated and leveraged throughout each step and, again, there's quite a bit of human interaction along the way. The literature elaborates on how the machine-side of the process works and the research brings a level of comprehension as to how these steps go forward and why. The answers give evidence to added steps in the value chain before and after the core process of programmatic advertising. We learn that at one end there's the advertiser who would like to advertise, the media agency who set up the campaign, plans it out and makes the ads for the customer and there's the agency trading desk implements the plan and inserts the details in to the system. It depends on the way that the inventory is bought as to how the process proceeds from here. The interview answers explain, that after the auction process (RTB), the ad exchange sends the winning bid's ad to the publisher's ad server, which tells the user's browser which ad to display.

Question 3's answers explain the differences between programmatically and non-programmatically bought advertising inventory. The research uncovers real life examples, advantages and disadvantages of both buying mechanisms. We learn that non-programmatic trading has its limitations and is not preferred, however has strengths and value over programmatically bought advertising. What's interesting is to learn that there's a priority when it comes to ad booking – and direct advertising has highest priority due to its value for publishers. Question 4 brings clarity in to what data actually is and supports the literature with examples of party data and how it is implemented. The interviewees' answers also shed some light on how data can be more valuable to some than others and uncovers the truth about clickbait advertising. It would be very beneficial for more people to understand how these (news) sites work and why they're being invited on to pages with ridiculous headlines. Question 5 explains how data is used and how it works in a technical sense.

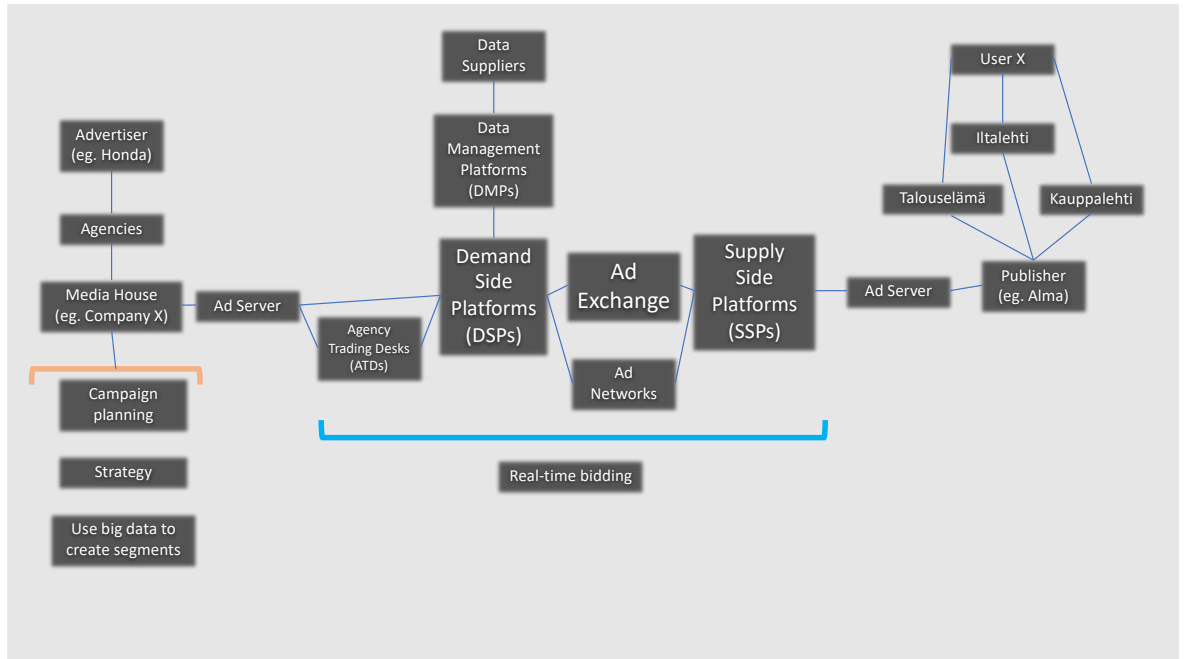


Figure 7. The Value Chain in Programmatic Advertising

The final conceptual framework of the programmatic advertising value chain is drawn out in the picture above. The left side of the diagram indicates the buyer's side of the value chain, where all planning and marketing strategy comes in to play. In the middle, are the machines that work with data and auction via real-time bidding (RTB). On the right side of the diagram is the seller's side of the value chain, where users actually see the advertising when scrolling through websites. What we've learnt through this research is that the value chain isn't a singular left to right process, as it depends on which side you look at the value chain from. There are two sides of this coin – the buyer's and the seller's sides. The programmatic ecosystem's lifecycle from the advertiser's point of view goes as follows:

- 1) Customer brief's advertiser (media agency) of marketing campaign
- 2) Either agency or advertiser makes adverts for campaign
- 3) Media agency sends the campaign material to agency trading desk via ad server
- 4) Trading desk sets up campaign within DSP and attaches relevant data through data management platforms, who get data from suppliers
- 5) DSP engages with ad exchange and/or ad networks to begin trading process
- 6) Ad exchange connects with SSP to engage auction using real-time bidding (RTB)

On the other side of the table, there's the user who goes on a website and ignites the process for the seller's side of the value chain. The life of an ad, from the seller's perspective go as follows:

- 1) The value chain begins when User X clicks on a URL and a browse begins to load
- 2) The publisher (eg. Alma) asks their ad server if there's an ad available

- 3) Ad priority follows 1) Direct, 2) Programmatic guaranteed, 3) PMP and 4) open
- 4) If programmatic, the ad exchange puts the advertising slot up for auction and send to multiple DSPs
- 5) The ad exchange also sends over data relevant to user profiling for targeting
- 6) DSP's with matching parameters respond to auction
- 7) DSP adds targeting, budget and data and places bid
- 8) Ad exchange runs second price auction
- 9) The winning bid pays second highest price + 0,01 €
- 10) Ad exchange sends price and winning ad to publisher's ad server
- 11) Publisher's ad server tells browser which ad to display
- 12) Advertiser's ad server sends winning ad to browser
- 13) Browser displays web page with winning ad
- 14) Browser tells DSP of impression

Each 'step' of these lists have a number of variables behind the value chain, which are explained during this research. What was outside the scope of this research paper were subjects that we could've explored in more detail, like big data and it's affects in marketing science, data analysis methods and the future of programmatic advertising. This research paper merely touches the surface of this phenomenon and each subheading of the literature part has information behind them to spark their own thesis subjects. This research paper has been a great introductory piece in to programmatic advertising, data targeting and big data analysis of digital marketing and the results show there's room for further research.

By doing this thesis and completing this process I've developed vastly as a researcher and I see the knowledge gained being a huge attribute in future studies. I've acquired useful information in the field that I'm pursuing and achieved everything that I set out to look for through this thesis. Without the research I wouldn't consider myself as knowledgeable and confident in data-driven marketing as I do today. Completing the literature part strengthened what I thought I knew about the value chain and helped me learn a lot of new things about data targeting and segmentation. The research and answers have given me insight into the lives of experienced practitioners and the thesis has helped bring a greater understanding to the subject. In a practical sense I have looked at what has happened in my day to day life of practicing this field and my research findings from this project show that there are a lot of aspects where we could improve upon, a few steps in the process that still need automating and lots more to learn about programmatic advertising.



## 6 References

Ackley, M. 3 July 2014. The New Data Currency In A Digital World. Search Engine Land. URL: <https://searchengineland.com/new-data-currency-digital-world-195356>. Accessed: 17 October 2019.

Angelo State University. Research Methods: Empirical Research. URL: <https://www.angelo.edu/content/files/25578-research-methods-empirical-researchpdf>. Accessed: 5 October 2019.

Appnexus 2018. The Digital Advertising Stats You Need For 2018. URL: [https://www.appnexus.com/sites/default/files/whitepapers/guide-2018stats\\_2.pdf](https://www.appnexus.com/sites/default/files/whitepapers/guide-2018stats_2.pdf). Accessed: 24 August 2019.

Ausubel, L. & Milgrom, P. 2006. He Lovely but Lonely Vickrey Auction. Stanford University. URL: <https://web.stanford.edu/~milgrom/publishedarticles/Lovely%20but%20Lonely%20Vickrey%20Auction-072404a.pdf>. Accessed: 10 October 2019.

Bradt, G. 14 September 2016. Wanamaker Was Wrong – The Vast Majority of Advertising Is Wasted. Forbes. URL: <https://www.forbes.com/sites/georgebradt/2016/09/14/wanamaker-was-wrong-the-vast-majority-of-advertising-is-wasted/>. Accessed: 24 August 2019.

Cambridge University Press 2019. Cambridge Business English Dictionary. URL: <https://dictionary.cambridge.org/dictionary/english/media-agency>. Accessed: 20 July 2019.

Chambers, P. 2 July 2018. News. DMP is no magic bullet, but marketers must get a grip on data. AdNews. URL: <https://www.adnews.com.au/news/dmp-is-no-magic-bullet-but-marketers-must-get-a-grip-on-data>. Accessed: 7 September 2019.

David, B. 1 February 2016. Six advantages of real-time bidding for publishers. Econsultancy. URL: <https://econsultancy.com/six-advantages-of-real-time-bidding-for-publishers/>. Accessed: 3 August 2019.

Digiday 2017. WTF is programmatic advertising? An essential guide to the acronyms and underpinnings of modern digital advertising systems. URL:

<https://digiday.com/wp-content/uploads/2017/02/wtf-bible-by-OpenX.pdf>. Accessed 20 July 2019.

Digitaland 2017. Digital advertising blog. What tracking pixels are and why they matter to your next digital ad campaign. URL: <https://www.digitaland.tv/blog/what-is-tracking-pixel-ht/>. Accessed: 7 September 2019.

eMarketer 2017. Programmatic Ad Spending Soars in Finland URL: <https://www.emarketer.com/Article/Programmatic-Ad-Spending-Soars-Finland/1015765>. Accessed 20 July 2019.

eMarketer 2019. UK Programmatic Digital Display Ad Spending. URL: <https://www.emarketer.com/content/uk-programmatic-digital-display-ad-spending> Accessed: 27 July 2019.

eMarketer 2019. US Programmatic Ad Spending Forecast 2019. URL: <https://www.emarketer.com/content/us-programmatic-ad-spending-forecast-2019>. Accessed: 27 July 2019.

Given, L. 2008. The SAGE Encyclopedia of Qualitative Research Methods. Sage Publications Inc. London.

Gonzalvez-Cabanas, J. & Mochon, F. 2016. Operating an Advertising Programmatic Buying Platform: A Case Study. International Journal of Interactive Multimedia and Artificial Intelligence, Vol 3. URL: [https://www.researchgate.net/publication/296198622\\_Operating\\_an\\_Advertising\\_Programmatic\\_Buying\\_Platform\\_A\\_Case\\_Study](https://www.researchgate.net/publication/296198622_Operating_an_Advertising_Programmatic_Buying_Platform_A_Case_Study). Accessed: 12 October 2019.

Google 2019. Google Ads Help: About audience targeting. URL: <https://support.google.com/google-ads/answer/2497941?hl=en>. Accessed: 24 August 2019.

Google Patents 2019. Data management platform for digital advertising. URL: <https://patents.google.com/patent/US20140279074A1/en>. Accessed: 7 September 2019.

Gutman, B. Kellogg Proves ROI of Digital Programmatic Buying. Forbes. URL: <https://www.forbes.com/sites/marketshare/2012/11/09/kellogg-proves-roi-of-digital-programmatic-buying/>. Accessed: 3 August 2019.



IBM 2019. What is big data analytics? URL: <https://www.ibm.com/analytics/hadoop/big-data-analytics>. Accessed: 7 September 2019.

Interactive Advertising Bureau 2017. Ohjelmallisen ostamisen opas. Ohjelmallisen ostamisen työryhmä. IAB Finland Ry. Helsinki. URL: <https://www.iab.fi/media/pdf-tiedostot/standardit-ja-opaat/ohjelmallisen-ostamisen-opas-2017.pdf>. Accessed: 24 August 2019.

Kane, T. 29 January 2017. Wired Mesh: Understanding Programmatic Advertising: a brief look at its history. Medium. URL: <https://medium.com/wired-mesh/understanding-programmatic-advertising-a-brief-look-at-its-history-411dd5842304>. Accessed: 20 July 2019.

Kotler, P. Marketing, 9<sup>th</sup> Edition. Pearson Australia. Sydney.

Lotame 2019. 1<sup>st</sup> party data, 2<sup>nd</sup> party data, 3<sup>rd</sup> party data: What does it all mean?. URL: <https://www.lotame.com/1st-party-2nd-party-3rd-party-data-what-does-it-all-mean/>. Accessed: 7 September 2019.

Management Study Guide 2015. Advertising Agencies – Meaning, its Role and Types of Agencies. URL: <https://www.managementstudyguide.com/advertising-agencies.htm>. Accessed: 24 August 2019.

McArthur, David N. & Griffin T. 1997. A marketing management view of integrated marketing communications. Journal of Advertising Research, vol. 37. Advertising Research Foundation. New York City.

McConnell, T. June 2017. WARC Exclusive: Offline media and programmatic advertising. WARC. URL: [https://www.warc.com/content/paywall/article/warc-exclusive/offline\\_media\\_and\\_programmatic\\_advertising/111423](https://www.warc.com/content/paywall/article/warc-exclusive/offline_media_and_programmatic_advertising/111423). Accessed: 20 July 2019.

MTG Advertising. A Brief Look at the History of Modern Advertising. URL: <https://www.mdgadvertising.com/marketing-insights/a-brief-look-at-the-history-of-modern-advertising/>. Accessed: 3 August 2019.

New Marketing Institute 2019. Programmatic 101. Intranet. Real Time Bidding (RTB). Accessed: 3 August 2019.

O'Hara, C. 25 January 2016. Data Triangulation: How Second Party Data Will Eat The Digital World. AdExchanger. URL: <https://adexchanger.com/data-driven-thinking/data-triangulation-how-second-party-data-will-eat-the-digital-world/>. Accessed: 17 October 2019.

Online Etymology Dictionary. Marketing. URL: <https://www.etymonline.com/word/marketing>. Accessed: 10 August 2019.

Oracle Data Cloud 7 October 2016. Data 101: First, Second and Third Party Data. YouTube video. URL: <https://www.youtube.com/watch?v=mZXjrHOPlag>. Accessed 14 September 2019.

Ozcelik, A. & Varnali, K. 2018. Effectiveness of Online Behavioral Targeting: A Psychological Perspective. Electronic Commerce Research and Applications. URL: [https://www.researchgate.net/publication/329351228\\_Effectiveness\\_of\\_Online\\_Behavioral\\_Targeting\\_A\\_Psychological\\_Perspective](https://www.researchgate.net/publication/329351228_Effectiveness_of_Online_Behavioral_Targeting_A_Psychological_Perspective). Accessed: 21 September 2019.

Relevant 2017. Distribution and management of online advertising and ad server consulting. URL: <https://relevant.fi/en/distribution-and-management-of-display-mobile-and-video-advertising-and-adserver-consulting/>. Accessed: 25 August 2019.

Research Methodology 2019. Causal Research. URL: <https://research-methodology.net/causal-research/>. Accessed: 5 October 2019.

Zawadzinski, M. 23 January 2015. How does real-time bidding (RTB) work? ClearCode. URL: <https://clearcode.cc/blog/real-time-bidding/>. Accessed 3 August 2019.

Zenith 2018. 65% of digital media to be programmatic in 2019. URL: <https://www.zenithmedia.com/65-of-digital-media-to-be-programmatic-in-2019/>. Accessed: 20 July 2019.