

MASTER

The influence of branded search on the relationship between social media advertising and search engine advertising on sales

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EINDHOVEN UNIVERSITY OF TECHNOLOGY



MASTER THESIS

The influence of branded search on the
relationship between social media
advertising and search engine
advertising on sales

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Executive Summary

Introduction

This research is about a company that focuses on the creation and distribution of watches and jewelry for women. Currently, their products are sold in more than 4000 physical retail locations, divided over 42 countries. The company (Company X) uses advertisements to create more brand awareness. As brand awareness is difficult to measure, other constructs such as branded searches can be used to identify the level of brand awareness. Social media advertising (SMA) is a form of online advertising, consisting of advertisements that are spread through social media platforms. Search engine advertising (SEA) is a type of advertisement where a company pays a search engine (e.g. Google) to show their sponsored text advertisement and website link on the top of the search page. In this research, the constructs of SMA, SEA, branded search and sales are analysed. The main research question being answered is:

RQ. *What is the influence of SMA and SEA on sales and what is the influence of branded search in this relation?*

To support this research and to find an answer to the main research question, the following hypotheses were formulated using available relevant literature:

H1a. *The amount spent on social media advertising, is positively related to the number of branded searches*

H1b. *The amount spent on search engine advertisements, is positively related to the number of branded searches*

H2a. *The amount spent on social media advertisements is positively related to the sales value*

H2b. *The amount spent on search engine advertisements is positively related to the sales value*

H3. *The number of times there is searched for a brand positively relates to the sales value*

To empirically test the formulated hypotheses, data from Company X was gathered and used.

Methodology

Data was gathered between 29-03-2021 and 31-07-2022. The source from which the SEA data were Google Ads and Google Search Console, queried through SuperMetrics. The data source of the SMA data was Facebook Ads through SuperMetrics.

It was chosen to use a log-log model to explain the variables. After the log transformation the model is linear, which makes OLS an appropriate method to estimate the effects. The log-log model is a model with diminishing returns. A model with diminishing returns to scale is appropriate as it is expected that the sales value will increase when the amount of advertising spending increases, but that every extra Euro invested in advertising results in a lower increase in sales value than the previous Euro invested. Log transformations are used in different models that have sales or search as a dependent variable (Dinner, Heerde Van, & Neslin, 2014). The branded search and the sales model can be captured by the following equations:

$$\begin{aligned} \ln BrandedSearch_t = & \beta_{1,0} + \beta_{1,1} SMAAdStock_t + \beta_{1,2} SEAdStock_t \\ & + \beta_{1,3} ChristmasPeriodDummy_t + \beta_{1,4} MothersDayDummy_t + \mu_{1,t} \end{aligned} \quad (1)$$

$$\begin{aligned} \ln Sales_t = & \beta_{2,0} + \beta_{2,1} SMAAdStock_t + \beta_{2,2} SEAdStock_t + \beta_{2,3} \ln BrandedSearch \\ & + \beta_{2,4} SiteWideSaleDummy_t + \beta_{2,5} SummerSaleDummy_t \\ & + \beta_{2,6} WinterSaleDummy_t + \beta_{2,7} CyberWeekDummy_t + \beta_{2,8} BlackFridayDummy_t \\ & + \beta_{2,9} ChristmasPeriodDummy_t + \beta_{2,10} MothersDayDummy_t \\ & + \beta_{2,11} EmailMondayDummy_t + \beta_{2,12} EmailWednesdayDummy_t \\ & + \beta_{2,13} SMACopula_t + \beta_{2,14} SEACopula_{\mu_{2,t}} \end{aligned} \quad (2)$$

There are reasons to believe that endogeneity might arise in the sales model. No appropriate instrumental variables were found so there was made use of the Gaussian copula approach, which is an instrument-free method. With the Gaussian copula approach an extra variable is added to the model to control for endogeneity.

Results

Figure 1 shows the main results from this research. The model shows that SMA and SEA costs are both positively associated with the number of branded search impressions and with the sales value.

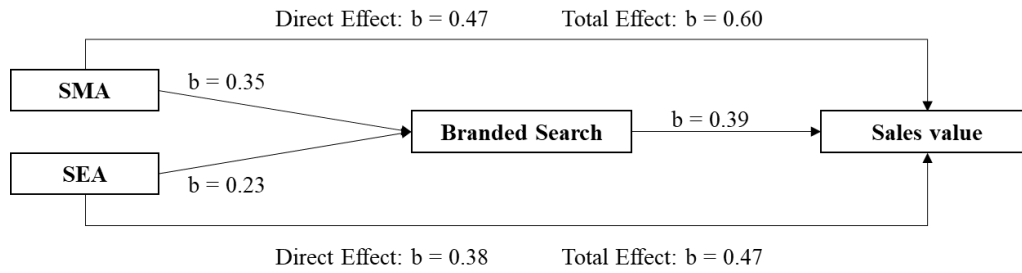


Figure 1: Conceptual Model with Results

Discussion & Conclusion

If a person would see an advertisement of a product that they can be interested in, it makes sense that they would want to search for more information regarding such product. This search will most likely be executed through a branded search. The suggestion that a branded search term is already quite specific and that there is a large chance that a customer searching for a more specific search term has a higher purchase intention (Montgomery, Hosanagar, Krishnan, & Clay, 2004) is supported. With the support of all of the hypotheses, the research question is answered. More spending on SMA and SEA leads to a higher sales value. By also adding the number of branded searches that are a result of the advertisements the total effect on sales is even higher.

This research has given a more complete overview of how different forms of online advertising relate to sales. It is expected that the research can be expanded to similar types of companies. It is shown that branded search is an antecedent of sales value. With the use of Google trends or Google Search Console companies can analyse how many times potential customers search for their brand or for competing brands. Using this, companies can make an estimate on how they are performing in the market and compare it to their competitors. What is found in this research is that SMA has a larger impact on both the amount of branded searches and the sales value than SEA. This implies for companies that it is more effective to invest a larger part of their budget to SMA and a smaller part to SEA.

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Acronyms

B2B business-to-business. 2

B2C business-to-customer. 2, 17

CICs customer-initiated contacts. 5

CPA cost per action. 3

CPM cost per thousand. 3

CR conversion rate. 3

CTR click-through rate. 3, 5, 7

FICs firm-initiated contacts. 5, 12, 35

MSE mean squared error. 27, 29, 31

OLS ordinary least squares. 24, 27, 28

OOH out of home. 2, 9

SEA search engine advertising. 2, 5–10, 12, 14, 16, 17, 19, 24, 29, 32, 34–38, 46

SMA social media advertisement. 2, 5, 6, 8, 9, 12–14, 16, 17, 19, 24, 29, 31, 32, 34–38, 46

VIF variance inflation factor. 27, 29, 31

Abstract

This research investigates the effectiveness of social media advertising (SMA) and search engine advertising (SEA) on the number of branded searches and the sales value. The research was conducted a company that specializes in the creation and distribution of watches and jewelry for women. Through advertising, it is believed that stronger brand associations can be created, increasing brand awareness which in turn could lead to sales. It is hypothesized that by using SMA and SEA more branded searches are conducted, which has a positive effect on the sales value. A log-log model was employed to analyze the gathered data, as this type of model is appropriate for analyzing relationships with diminishing returns. Overall, this research provides valuable insights into the relationship between advertising and branded searches, and the potential for SMA and SEA to drive sales for a company.

Keywords: branded search, social media advertising, search engine advertising, sales

1 Introduction

In 2017, the amount of online advertising spending was 41% of the total advertising spending (Kafka & Molla, 2017). This budget keeps on growing together with the amount of options for online advertising (Liu-Thompkins, 2019). This means that research regarding online advertising is staying relevant. The goal of this research is closing a gap in the literature regarding online advertising by using the real-life data of a company. In this section the company is going to be introduced and their advertising description and goals are going to be elaborated on. After that the gap in the literature is going to be sketched and the research question is going to be formulated based on that.

1.1 Company Introduction

Company X is a company that focuses on the creation and distribution of watches and jewelry for women. Their goal is to create affordable watches that are fun to wear and that can be seen as a fashion accessory rather than just a timepiece. The website of Company X was launched in July 2014 and they immediately shipped their goods to different countries all over the world. Company X started with only selling watches, but later expanded to also selling other types of jewelry. Their office is located in the Netherlands, together with their warehouse. The watches and jewelry are designed in-house, after which the designs are send to an external manufacturer. Company X also offers different types of personalized pieces. The pieces that are engraved are stored in bulk

in the warehouse, but a smaller part of this stock is stored at the engraving company. The non-engraved personalized jewelry are first stored in the warehouse, where they are assembled and send directly to the customer.

Company X does not only focus on business-to-customer (B2C), but also on business-to-business (B2B). Meaning that there are two ways in which customers can buy their products. The first way is by using Company X's own website (B2C) and the second way is via one of the retailers of Company X (B2B). These retailers are department stores like "de Bijenkorf" or independent jewelry stores. As of this time Company X does not have their own store. Currently Company X sells their brand in over 4000 physical retail locations, which are divided over 42 countries. As the subject of this research regards advertising the next section will explain the advertising strategy of Company X.

1.1.1 Advertising at Company X

In order to promote its products, Company X uses different types of advertising. Advertisements are mainly placed online, but in the Netherlands also offline campaigns are employed. For offline advertisements they make use of out of home (OOH) advertisements. These are posters that are placed in bus shelters all over the Netherlands. In 2022, they also started a television campaign in the Netherlands.

Next to this, Company X uses different online media to broadcast their advertisements. Most of their advertising budget goes to social media advertisement (SMA), with the large majority of their advertisements being on Facebook and Instagram. The platforms are paid to share Company X's advertisements on the timelines of the selected target audience. Another part of their budget goes to search engine advertising (SEA) like Google Search and Google Shopping. Company X invests to be found on the search page when people query using specific search terms. An example of a search or shopping advertisement can be found in Appendix A. More specific information regarding the online advertisements can be found in section 1.2.2. Company X also advertises by sending e-mails to the people who subscribed to their newsletter or to people who have purchased an item on the Company X website and have accepted to receive advertisements.

Advertising campaign goals

The goal of an advertising campaign can differ. Company X makes a distinction between direct response and reach campaigns. A direct response campaign is a form of advertisement where a company expects to get an immediate return for their advertising in terms of sales or revenue. Generally these campaigns are targeted to more specific, smaller, tar-

get audiences with a higher associated cost. However, the people targeted have a higher chance of being interested in the advertisement. The goal of this campaign is to create more conversions, so the conversion rate (CR) needs to increase. With this, however, the cost per action (CPA) will go up as well as it is more expensive to target the specific group.

The goal of the reach campaigns is to increase brand awareness by exposing the target audience to the Company X brand assets with a certain frequency. This is a long-term objective, so immediate returns for these campaigns, e.g. sales or conversion, are not the main goal. Generally the cost per thousand (CPM), or cost per thousand impressions, for these campaigns is a lot lower than for conversion driven campaigns (e.g. direct response). However, the CPA, costs per action where the type of action is determined by the advertiser, is generally a lot higher. This is because a far lower click-through rate (CTR), the rate of people who have seen the advertisement and clicked on it, and a far lower CR, the rate of people who interacted with the advertisement and made a conversions. A conversion can mean different things and it depends on how the company defines the conversion. It can, for example, count as a conversion when a sale has been made or a certain number of web pages has been visited (Pan, Mao, Ruiz, Sun, & Flores, 2019).

Company X has the goal to reach a large audience of females between the ages of 18 and 44. That is why there is not specifically focused on females with an interest in topics like jewelry or fashion. For this reason a reach campaign is most suitable. Their reasoning behind this is that this is a way to create more brand awareness as they most likely reach people who have never heard of the brand. Whereas, when you would target specific people with an interest in jewelry or fashion there is a larger chance of those people already knowing the brand. More specifically, they want to reach "*light category buyers*". These are potential customers who on a rare occasion might buy in to a specific category (Romaniuk & Sharp, 2016). In Company X's case those are customers who do not buy jewelry or watches on a regular basis. If this principle would be compared to the Pareto principle (20% of customers take care of 80% of profit (Brynjolfsson, Hu, & Simester, 2011)), then the light category buyers are part of the other 80% of the customers. This means majority of consumers will fall in this group. According to Romaniuk and Sharp (2016), if you want to grow your brand, it is important to take this group into consideration as they account for the majority of sales in the category (their beliefs are not in line with the Pareto principle). The book "How brands grow" by Romaniuk and Sharp (2016) is where Company X bases a large part of their marketing strategy on.

1.2 Research Objectives

This research has the goal to provide both practical relevance to Company X and theoretical relevance to literature. In this section, first the practical relevance is discussed followed by that theoretical relevance. As a conclusion from both, the main research question is defined.

1.2.1 Practical Relevance

As described in the previous section, Company X uses advertisements to create more brand awareness. As brand awareness is difficult to measure, other constructs such as branded searches can be used to identify the level of brand awareness. Branded search is defined as a potential customer searching (online) for a demanded product, where the specific brand (in this case Company X) is used in their search query. The alternative to branded search is generic search, where a potential customer searches based on a generic product characteristic that is not brand-specific (e.g. a watch), without including any brand names (Rutz & Bucklin, 2011). Company X hypothesizes that branded search is a metric to measure a form of brand awareness, as it can be stated that someone who searches for Company X directly is aware of the brand. Company X is interested what the relation is between advertising and branded search, and whether the presence of branded search also influences the sales value. This way, Company X acquires information whether advertising influences branded searches and therefore brand awareness, and if an increase in branded searches leads to more sales. To define how advertisements could spill over into branded search, which could lead to sales, a hypothetical situation is now sketched.

Rutz and Bucklin (2011) hypothesized that a generic search could spillover in a branded search. The following scenario was described by them (rewritten to fit this research): A potential customer is searching online for women's watches, but is unfamiliar with the different brands that are available. The potential customer starts their search broad. They search for example for "women's watch" or "watch gold". The potential customer clicks on the sponsored shopping or search advertisement of Company X, browses the website, but does not take any action. At a later point in time they continue their search for a watch and they recall the Company X website. Now the potential customer searches for "Company x" or "Company X watches" and then clicks on the link leading to Company X's website, where they place an order. The conclusion of their research was that generic search can spill over in to branded search. This because a generic search leads to brand related information, which creates awareness for the customer that the brand provides a solution to the problem/need that they have (Rutz & Bucklin, 2011).

In this research there is not only going to be studied if there is a relation between generic paid search and branded search, but also if the number of branded searches lead to higher sales value. Also another hypothesis is tested, which is the relation between SMA and branded search. For this relation a similar scenario can be formulated: a potential customer is scrolling on social media and comes across an advertisement from Company X. They might click on the advertisement, which directs them to the website, or they see the advertisement without engaging with it. The advertisement can stimulate a recognition of need for the product (see chapter 2) in the potential customer. They then perform a branded search, which leads them to the Company X website, where they place an order.

1.2.2 Theoretical Relevance

It is not only interesting for Company X to know whether the previously sketched relations exist, but it also has theoretical value. In the sections below the theoretical relevance is going to be explained together with some background information regarding the different concepts in this research.

Online Advertising

Online advertising can be defined as messages that are deliberately placed on third-party websites, also including search engines, that are available through the Internet (Ha, 2008). Online advertising can be divided into two different forms, which are firm-initiated contacts (FICs) and customer-initiated contacts (CICs). FICs are pushed on the customer, for example, email or an advertisement on social media. CICs, on the other hand, are triggered by an action executed by the customer (Shankar & Malhotra, 2007). These can, for example, be paid search advertisements like Google Search (De Haan, Wiesel, & Pauwels, 2016). One aspect of CICs is that a company only experiences the benefits when a customer takes an action that provokes the CICs (De Haan et al., 2016).

In literature there is already a lot that can be found regarding online advertising and the relation on different online measurements of success. Research has already been conducted regarding the prediction of the CTR in online advertising, which is the probability that when a user sees an online advertisement they also click on it (Yang & Zhai, 2022). Research has also already focused on the prediction of conversions in online advertising (Pan et al., 2019). As described, there are different types of online advertising. Not for all types of online advertising applicable research is available on the relation on branded search. Next, SMA and SEA are going to be explained, because this research will focus on these forms of advertising.

Social Media Advertising

SMA is a form of online advertising. These are advertisements that are spread via different social media platforms. Advertisements on social media platforms can be divided into paid and earned media. For paid media a company needs to go through different steps in order to post a social media advertisement. These steps differ depending on the type of social media. Facebook and Instagram are both from the same company (Meta), so this process is the same. The first step is picking a marketing goal, for example brand awareness and a target group needs to be picked. Then the advertisers choose on which platform and what placement they want to be shown and they need to set their budget. The last step is to provide the advertisement in the form of an image, video or slideshow (*Facebook Advertenties*, n.d.). On the other hand, earned media are the social media accounts of a company. A company can have their own, for example, Facebook or Instagram account on which they have followers. They can freely post on those accounts for their followers to see it. Companies can also use influencers to promote their product on social media, which is left out of scope in this research.

Social media is an active factor in peoples everyday life and people are becoming more engaged in the major social media platforms. This makes it an interesting platform to explore for organisations (Alalwan, 2018). In 2016, more than 30 billion USD was spend on SMA (Alalwan, 2018). Practitioners and researches have both shown a significant interest in SMA (Alalwan, 2018). Literature has found the impact of SMA on different factors like customer purchase intention (Alalwan, 2018; Chu, Kamal, & Kim, 2013), consumer engagement (Unnava & Aravindakshan, 2021) and consumer-based brand equity (Raji, Mohd Rashid, Mohd Ishak, & Mohamad, 2020). As described in section 1.1.1 most of Company X's advertising budget goes to SMA, which makes it useful for Company X to know if their goals are met. There was, however, no applicable research found regarding the relation between SMA and branded search. Thus, investigating this relation is both interesting for practitioners and academically.

Search Engine Advertising

Another form of online advertisement, that is going to be discussed, is SEA. On Google, SEA can be divided into Google Search and Google Shopping. Google search and shopping are a form of paid search. This is when a company pays the search engine to show their sponsored text advertisement and website link on the search page (figure 9). In order to appear in a sponsored Google Search advertisement a company needs to provide the search machine with a list of keywords on which they want to be found. These keywords can fall in two different categories, which are branded and generic. Keywords

are the words that a company provides, in this case Google, on which they want to be found. A search term is a word or phrase that a users searches for on the search engine. If the example of Company X is taken into account, a branded search term could be "Company X watch", where a generic search could be "women's watch". For a list of the branded keywords that Company X has provided see Appendix B. Both branded and generic search terms could result in a paid search advertisement of Company X being shown.

The amount that a company needs to pay for a certain search term to result in their advertisement being shown depends on the bidding process. This process consists of three different steps. The first being the maximum price that the company is willing to pay for a click, this is called the max bid. The second is the quality score. The better the search term fits the website of the company the higher the quality score. The last part of the bidding process is the ad rank, which is the max bid times the quality score. The company with the highest quality score needs to bid less to be the top in the ad rank. This means that branded search is relatively cheaper per click than generic search. This is because the brand name of a company most likely results in a high quality score, because the search term fits that company the best. Google Shopping (figure 10) works a lot different then Google Search, because you cannot directly target search terms or bid on keywords. Instead, a company needs to provide a list with all of the products that they want to feature on Google Shopping, together with a title, picture and a product description. Google Shopping then matches the words in the title and description to search terms. This means that a company cannot bid on search words, but only on products or product groups. Google Shopping originally was a price comparison tool.

There are different challenges when researching sponsored search and the influence on revenue. An example of this is the identification of relevant advertisements (Budhiraja, Ralla, & Reddy, 2019). Literature can be found regarding different effects of SEA. There is research that focused on predicting the CTR of advertisements on search pages (Kumar et al., 2015), but also research regarding direct and indirect sales has been conducted (Lu & Zhao, 2014). Direct sales are the sales of the products that match the search terms. An indirect sale happens when a user types in a search term and visits the website, but then clicks further on the website and buys something that is unrelated to the search term (Lu & Zhao, 2014). No applicable research was found regarding the relation between SEA and sales that also includes branded search. As described in section 1.2 in the paper by Rutz and Bucklin (2011) the spillover between paid search advertising and branded search is examined, however in the research only textual web advertisements are taking

into account. Currently, there is also the possibility of advertising with images with the use of Google Shopping. When the article of Rutz and Bucklin (2011) was written this was not an option yet, so it is not included in the research. For Company X, SEA is one of the most important forms of advertising. This makes the relation between SEA and branded search both academically and practically relevant.

Branded Search

There are multiple papers that find a positive effect between television advertising on the number of branded search (Du, Xu, & Wilbur, 2019; Chandrasekaran, Srinivasan, & Sihi, 2018). The effect of certain types of advertising on branded search is established, however, no research about the effect of SMA on branded search was found. There is also a gap in the research about the effect of SEA on branded search as the Google Shopping advertisements are not included in the previous research (Rutz & Bucklin, 2011).

1.2.3 Main Research Question

As described in the previous sections, there has been research regarding SEA, SMA, branded search and sales. However, there are still gaps regarding the relation between these variables. There was no research found regarding the relation between SMA and branded search. There was research found regarding SEA and branded search. However, this research was not complete. In order to bridge the gap in the research the following research question is formulated.

RQ. *What is the influence of SMA and SEA on sales and what is the influence of branded search in this relation?*

In order to answer the research question different hypotheses are going to be formulated based on existing literature. The first step of finding the right theoretical framework is by getting a broad understanding of the topic. What all of the different construct in the research question have in common is that they are all part of the customer journey. That is why at first the customer journey is going to be sketched to be able to understand how all of the constructs relate to each other. After that there a more specific research will be done regarding the different relations. As not all of the relations are already established in literature there are some assumptions that need to be made. The scope in which this research will take place can be found in the next section.

1.3 Scope

Based on the statements given in section 1.2, the scope is defined in order to create a project plan that is feasible in the given time horizon and that significantly contributes to the research problem.

Advertising

In this research, only online advertising is included. The two types of online advertisements that are going to be included are SMA and SEA. For SMA the channels that are going to be included are Facebook and Instagram. The social media channels that are going to be excluded are Pinterest and TikTok. Company X has only advertised on those platforms for a short amount of time and only spend a very small amount of money on it. This is why there is expected that it would not have an impact on the model. For SEA only the generic Google Shopping and Google Search campaigns are going to be taken into account as indirect variables. Branded search is separately going to be added in the model that is why branded search campaigns are going to be excluded here.

Country

Company X sells their products in a lot of countries, as described in section 1.1. The countries in which the amount of sales and the advertising spending are highest are The Netherlands and Germany. There the advertising spend and the sales are the most consistent and the data is the most reliable. The Netherlands, however, will not be used as there are more factors outside of the scope of research that are of influence. As described in the previous section only online advertisements are going to be taken into account. In the Netherlands there already have been OOH advertisements and a television campaign. This is something that would influence the number of branded searches and sales and would thus make the research unreliable when only researching online advertisements. This is why the data of Germany is going to be used in this research.

Earned media

There are two different types of content that Company X posts on social media. These are earned media and advertisements. Earned media is the content that Company X posts on their own social media channels. It is chosen to not take this into account because people only see this content if they are following Company X on social media and are already aware of the brand. The other reasoning behind this is also that the data regarding earned media is less detailed than for advertisements. Company X also has way less impressions and reach for earned media than for paid media.

Retailer

As described in section 1.1 the products of Company X can be bought on the Company X website or via other retailers. It is not possible to receive all of the necessary data from the other retailers and there is no guarantee that the data that can be provided is reliable. That is why there is chosen to only focus this research on the sales made via the Company X website.

Time period

The data from branded search can only be accessed till 16 months ago. That is why there is chosen to pick a time period of 16 months. The data was gathered between 29-03-2021 and 31-07-2022.

Search engine

Company X advertises on two types of search engines which are Google and Bing. There is, however, a large difference in the amount that both search engines are used. For Company X less than 1% of the SEA budget is spend on advertising on Bing. Company X also does not invest in generic advertising campaigns or in shopping campaigns on Bing. As the model takes into account the costs of generic advertising Bing will not be of influence. That is why only data gathered form Google will be taken into account. There are also slight differences between the search engines, which means that the data cannot be aggregated.

2 Theoretical Framework & Hypotheses

In the introduction, the theoretical relevance of this research has been sketched. To be able to research the relations that exist between advertising, sales and branded search, this chapter discusses the available literature on those relations and following from this hypotheses are formulated.

To introduce the relations between the different constructs in this research, it is important to define the consumer's customer journey. When purchasing a product, a customer usually follows a certain path, which is called the customer journey. In the article by Lemon and Verhoef (2016) the customer journey is divided into three stages:

- The **pre-purchase stage** consists of all the different encounters that the customer has with the company/brand, environment or the category, before the actual purchase is made. These encounters can for example be the recognition of need, search or consideration. Practically, the pre-purchase stage starts when a customer recognises a need for a product and it ends when the customer considers that the need can be satisfied with a purchase (Pieters, Baumgartner, & Allen, 1995).
- The **purchase stage** consists all of the encounters that the customer has with the brand or the environment during the purchasing process. Examples of actions by consumers during this stage are ordering and paying (Lemon & Verhoef, 2016).
- The **post-purchase stage** consists of all the encounters that customers have with the brand and the environment after the purchase was made. The post-purchase stage encompasses consumer behaviors like the usage or consumption of the product or service request (Holbrook & Hirschman, 1982).

When taking into account the customer journey both online advertising and branded search are part of the pre-purchase stage. (Online) advertisements are a tool to instigate the need or want for a product in customers (Dowling et al., 2020) and branded search is a part of the search process of a customer. Of course, sales also are a part of the purchase stage of the customer journey. So when following the customer journey it would be logical that all three variables are in relation to each other. To formulate, the different relations sketched are evaluated on.

2.1 Advertising and Search

During the pre-purchase stage, one of the activities for customers is recognizing the need for a product (Pieters et al., 1995). This need for a product can be stimulated by

advertisements (Dowling et al., 2020). There are multiple articles that found that different types of advertisements lead to online search. The article by Guitart and Stremersch (2021) states that television advertisements generate online search, because an interest in the product is created. In order to get to know more about the product customers could be encouraged to search for more information online (Mayzlin & Shin, 2011). There are not only indications that television advertisement stimulate generic searches, however they also boost the chance of customers searching for branded search terms (Joo, Wilbur, Cowgill, & Zhu, 2014; Joo, Wilbur, & Zhu, 2016). Advertising is used by marketers to create brand awareness and convince consumers to make a purchase decision (Boulding, Lee, & Staelin, 1994). In the article by Lim, Guzmán, et al. (2022) it has been found that Kotler's promotion mix, specifically advertising, has a direct impact on Aaker's concept of brand equity, particularly on brand awareness. By advertising brand associations are created. Brand associations are all of the different links an individual has to a brand. By repetitive advertising stronger brand associations are created which increases brand awareness and also increases the probability that a consumer considers a product (Yoo, Donthu, & Lee, 2000). When an individual considers a product a branded search can be executed in order to find the product online. It can be assumed that in order to conduct a branded search, it is essential for individuals to possess a certain level of brand awareness. Not only offline advertisements, like TV advertising, could stimulate search. However, there can also be hypothesized that SMA and SEA are forms of online advertising that could encourage search, which is now elaborated on.

2.1.1 SMA and Branded Search

As discussed in section 1.2.2, SMA is pushed on the customer. This makes advertisements on both Facebook and Instagram FICs. Other types of advertisements that fall into this category are TV and display advertisements. Like stated before, literature has suggested that there is a positive relation between TV advertisements and branded search (Chandrasekaran et al., 2018; Du et al., 2019). This is a relation between a form of offline advertisement and branded search. SMA, however, is a form of online advertising which is also the case for display advertisement. There has been research which stated that there is a positive relation between display advertisement and branded search (Drivas, Sakas, & Giannakopoulos, 2019). The main difference of display advertisement and SMA is the advertising placement. Display advertisement, could in theory, be placed on any website, however SMA can only be placed on social media. Besides that, the two forms of advertising are relatively similar. Not only are they both FICs, but they also have in common that by clicking on the advertisement customers are most of the times redirected to the website of the advertiser. Due to these commonalities, there is reason to believe

that SMA has a positive relation with branded search. Therefore, the first hypothesis is:

H1a. *The amount spent on social media advertising, is positively related to the number of branded searches*

2.1.2 SEA and Branded Search

It can be proposed that a generic search can generate awareness of a brand's relevance to the goals of the user, leading to a branded search in the future. This awareness can then influence a user's decision to conduct further research on the brand or make a purchase (Rutz & Bucklin, 2011). In the research of Rutz and Bucklin (2011) the relation between generic search and branded search is found. There was found that generic search spills over into branded search. The bulk of this spill over happens within two weeks, however the peak of the branded searches is between the two and five days. This results in the second hypothesis:

H1b. *The amount spent on search engine advertisements, is positively related to the number of branded searches*

2.2 Advertising and Sales

Advertising does not only lead to branded search. According to Joshi and Hanssens (2010) the amount spend on advertising has a positive relationship with the market value of a firm. The value of a firm can be divided in both tangible and intangible value. The sales and profit of a company can be seen as tangible assets that are impacted by marketing instruments, like advertising. The other part of firm value, the intangible assets, can be assets like brand awareness. Advertising does not only have a direct effect on firm value, however it also has an indirect effect. There has been research about the role that advertising plays regarding consumer demand and the long-term brand building (Dekimpe & Hanssens, 1995). Where brand-building relates to the preference creation of customers through emotional associations with the brand (Cain, 2022). There is shown in research that traditional forms of offline advertising have both long-term, but also short term effects on sales (Dekimpe & Hanssens, 1995; Naik & Raman, 2003).

2.2.1 SMA and Sales

SMA not only stimulates brand awareness, but it can also stimulate customers to purchase a product. This, because using social media for promotion and communication can influence consumer decision making (Alalwan, 2018). When a social media user sees a

SMA and they have a positive reaction, it is likely that they support the theme of the advertisement. It is then more likely that the person has a higher interest in the product. If the person recognises the need for a product there is a higher chance that the person chooses the brand that is advertised (Lee & Hong, 2016). This is why the following hypothesis was formulated:

H2a. *The amount spent on social media advertisements is positively related to the sales value*

2.2.2 SEA and Sales

The motivation of companies to engage in SEA is an assumption that when users search for a keyword and their advertisement pops up, the user is interested in the displayed advertisement. This interest can lead to product sales on the website of the advertiser (Fang, Li, Huang, & Palmatier, 2015). Wang, Zuo, Yang, and Wu (2019) found that SEA on mobile devices (e.g. smartphone or tablet) positively relates to the number of direct sales. Because of these findings the following hypothesis was formulated:

H2b. *The amount spent on search engine advertisements is positively related to the sales value*

2.3 Influence of Branded Search

In the study by Jun, Yeom, and Son (2014) there was found that there was a significant correlation between branded search and the amount of sales. This research was done in order to analyze the adoption of new products or technologies. According to Rutz and Bucklin (2011), it can be proposed that generic search creates awareness for the searcher that a brand is relevant for their search term. Which could then spill over into a branded keyword search. It is unlikely that a generic search makes a user aware of a brand, however, it is more likely that it creates awareness that the brand meets the users requirements. When a customer uses a branded keyword, it essentially suggest that a customer retained the information about the brand from a previous exposure (Tunuguntla, Rakshit, & Basu, 2022).

When customers are searching online there are different stages that they could be in. They could be gathering information, comparing different brands and products or they could be close to making a purchase (Kireyev, Pauwels, & Gupta, 2016). According to Agarwal, Hosanagar, and Smith (2011), conclusions can be made regarding in what stage

a customer is when searching online based on their search terms. When there is searched for a more broad search term a customer is more likely in the phase of searching for information and have a low purchase intent. When a keyword is more specific, a customers targets a few product, then the purchase intent is likely to be higher (Montgomery et al., 2004). It could be suggested that a branded search term, most of the times, is already quite specific. Which would mean that when customers search for a branded search term they are aware of the brand and their purchase intention is higher. This is something that is supported by Rutz and Bucklin (2011), because there is shown that generic searches might not lead to a sale, however those searches can lead to future branded searches and sales. Based on these findings the following hypothesis is formulated:

H3. *The number of times there is searched for a brand positively relates to the sales value*

2.4 Conceptual Model

Based on the formulated hypotheses in the previous sections a conceptual model was made which can be found in figure 2. It is expected that all of the relations in the model are positive. All hypotheses are going to be evaluated empirically, for which data within Company X has been collected. Together with the theoretical background, the main research question will afterwards be evaluated on.

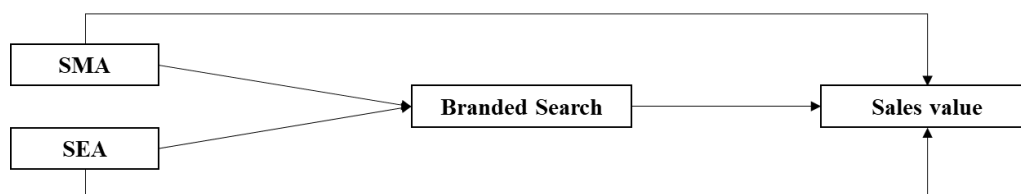


Figure 2: Conceptual Model

3 Data

3.1 Data Collection

The data used in this research was gathered from different sources, which will be explained in this section. Both the advertising data and the branded search data were gathered with the use of SuperMetrics. SuperMetrics is a tool which can gather data from different types of sources and convert it in to a spreadsheet program. This is useful, because otherwise all of the data would need to be gathered from several different sources individually. For this research the data was loaded in Google Sheets from which it was uploaded in IBM SPSS statistics 28 and in R Studio. In order to get the data suitable to answer the research question, the collected data needed to be filtered based on several aspects. Firstly, the start and end dates of the data were the same for all variables (except for adstock variables, see section 4.1.3). The data was gathered between 29-03-2021 and 31-07-2022. The data gathered was time-series data, so the dimension on which all data was filtered was set to "date". By doing this, the data points were aggregated per day. In the following subsections, the gathering of the different variables is going to be explained.

SEA

The source from which the SEA data was gathered was Google Ads through SuperMetrics. Google Ads is a platform, developed by Google, on which advertisers bid to be placed on the Google Search results with an advertisement. In order to include the criteria described in the scope (section 1.3), extra filters were required. The filter that is added is "*Campaignname DOES NOT CONTAIN brand*". By adding this, the branded searches are excluded as Company X names its campaigns based on (a) if the campaign includes branded or generic keywords and (b) if it is a search or a shopping campaign. In Google Ads, the accounts are separated based on country. So in order to get only the data of Germany the account was set to "Company X DE".

SMA

The data source of the SMA data was Facebook Ads through SuperMetrics. Facebook Ads is a tool created by Facebook on which advertisers can display their advertisements and can track performance. Company X does not divide the different accounts by their country code on Facebook Ads. To be able to only get the German data there is chosen to include a filter based on in which country the advertisement was shown. This filter was "*country EQUALS DE*".

Branded Search

The source of the branded search data was the Google Search Console through SuperMetrics. Google Search Console is a web service that can be used to, among other things, track the performance of search terms. Company X does not differentiate the accounts on country level. To only extract German data it was chosen to only include searches executed in Germany. The following filter was applied: "countryname EQUALS Germany". In Google Search Console there can be differentiated between branded and non-branded search. To only get the branded search the following filter was added: "branded_vs_nonbranded EQUALS branded".

Sales

The sales are gathered from Metabase, which is a system that gives the opportunity to explore different types of data. This program is, in the case of Company X, the most accurate way to get the overall B2C sales data. The sales data is the aggregated amount of income in euros from sales per day. Normally the sales data is divided per customer (order number). To get the aggregated sales value, the sales value of each order that has taken place on the same day were summed up.

3.2 Data Description

The data that is going to be used in this research is aggregated time-series data from Germany. All of the individual search impressions are aggregated per day. The same also holds for the sales value and the advertising costs. As mentioned before, the time period of which data was gathered is from 29-03-2021 to 31-07-2022 (490 days in total). Table 1 describes the different variables used in the models.

In table 2, the descriptive statistics of the variables can be found. Here can be found that, on average, almost three times more is spend on SMA ($M \approx 1884$, $S.D \approx 1195$) per day than SEA ($M \approx 605$, $S.D \approx 409$). The average value of sales income per day is around 7846 Euros ($S.D \approx 6686$) and the average number a branded search is executed per day is 603 times ($S.D \approx 384$). All of the standard deviations are relatively high. This is due to the high amount of fluctuations because of seasonality. This can also be seen in figure 3, 4 and 5. The reasoning behind these fluctuation periods can be found in section 3.2.2.

Table 1: Variable Operationalization

Variable	Operationalization
Sales	Daily aggregate euro of the B2C sales (excluding taxes and including discounts)
SMA	Daily Euros spend on advertisements on social media
SEA	Daily Euros spend on advertisements on the search engine excluding branded search
Branded Search	Number of times the search query contained a broad Company X search term per day
Site Wide Sale Dummy	A binary variable that is 1 on the dates that there is a site wide sale
Summer Sale Dummy	A binary variable that is 1 on the dates of the summer sale
Winter Sale Dummy	A binary variable that is 1 on the dates of the winter sale
Cyber Week Dummy	A binary variable that is 1 on the dates that there is cyber week
Black Friday Dummy	A binary variable that is 1 on Black Friday
Singles Day Dummy	A binary variable that is 1 on Singles Day
Christmas Dummy	A binary variable that is 1 on the weeks leading up to Christmas
Mother's Day Dummy	A binary variable that is 1 on the weeks leading up to Mother's Day
Email Monday Dummy	A binary variable that is 1 on Mondays
Email Wednesday Dummy	A binary variable that is 1 on Wednesdays

Table 2: Descriptive statistics

Variable	Mean	Standard Deviation (SD)
Sales	7845.71	6686.47
SMA	1883.92	1195.13
SEA	604.93	408,52
Branded Search	603.34	283.65
Site Wide Sale Dummy	0.03	0.17
Summer Sale Dummy	0.12	0.33
Winter Sale Dummy	0.04	0.19
Cyber Week Dummy	0.02	0.14
Black Friday Dummy	0.00	0.05
Singles Day Dummy	0.00	0.05
Christmas Dummy	0.06	0.23
Mother's Day Dummy	0.05	0.22
Email Monday Dummy	0.14	0.35
Email Wednesday Dummy	0.14	0.35

3.2.1 Independent Variables

The independent variables in this research are SMA and SEA, in specific the expenditures on both advertisement methods. The large majority of SMA spending is invested on Facebook and Instagram. The amount spend on other types of social media is negligible ($< 1\%$). From the expenditure on SMA, around 23% is invested in Facebook and the large majority of the rest of the budget is invested in Instagram. From the budget dedicated to SEA, around 16% is invested in Google Search and the rest (84%) is invested in Google Shopping. The actual amount of advertising spending on SEA is a bit higher, but those costs are not taken into account as those expenses regard branded searches. It is chosen to aggregate the Google Search and Google Shopping data. This is because when a person searches for a product both a search advertisement and a shopping advertisement of the same company can appear. Figure 3 shows the time-series plot of the amount spend on advertising for both SEA and SMA. There are different peaks in the data which are elaborated on in section 3.2.2. It can also be seen that the amount spend on SMA is much higher than on SEA. Around 76% of the advertising budget is invested in SMA.

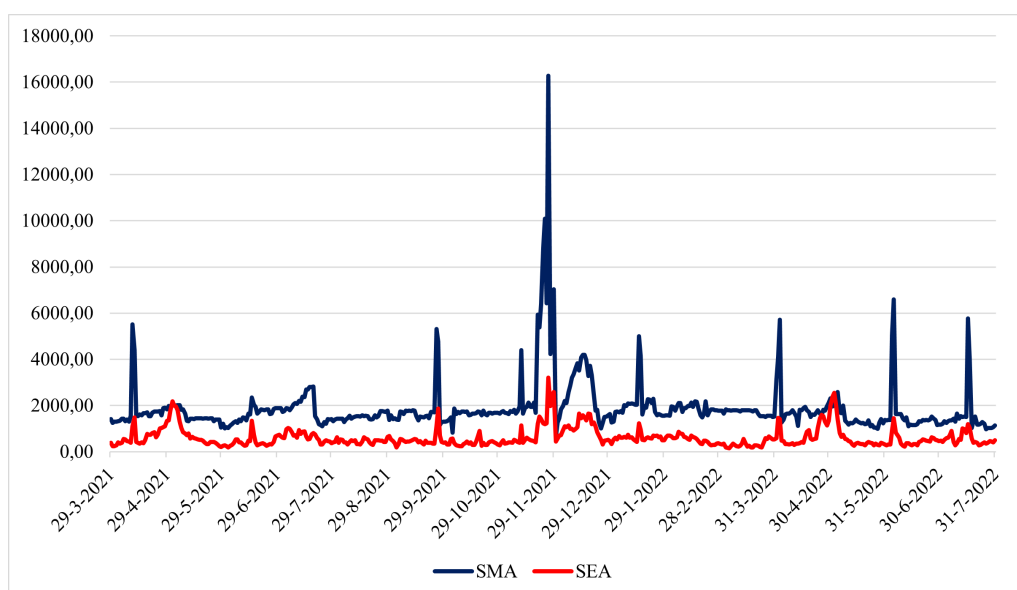


Figure 3: Ad Spending

3.2.2 Dummy Variables

Dummy variables can be added when a representation is needed of discrete events. In order to control for factors that might influence the dependent variables, dummy variables are added to the model. Company X has different promotions during the year, which need to be taken into account as those have an effect on both advertising spend and sales. The exact dates of when the dummy variables were included can be found in Appendix

C. All of the dummy variables were used in the analyses, described in section 4.1.2, as they all have an effect on the sales value. However, only the Christmas and Mother's Day period have an effect on the number of branded searches. There are peaks in the number of branded searches during the other periods, but those peaks can be attributed to the increase of advertising spending. The different dummy variables that are included in the models are explained below.

Site Wide Weekend

During the time-span that is taken into account in this research there have been multiple site wide sales. During these weekends, everything on the website is discounted by at least 20%. When the site wide weekend is active there is a higher advertising budget.

Summer/Winter Sale

There are longer sales periods called the winter and the summer sale. During these periods there is a focus on the archive items, which are from older collections and are always discounted. The advertisements focus on spreading the message of up to 70% discount on selected items. During these periods the advertising budget is also slightly higher.

Cyber Week

Cyber Week is also a period when Company X puts their items on discount. Cyber Week are the days leading up to Black Friday together with the weekend and the Monday after Black Friday. On the Monday, Tuesday, Wednesday and Thursday before Black Friday there were deals of the day. This means that on each of those days a different collection or product was 30% off. The Saturday and Sunday after Black Friday had a 20% off everything sale. On Cyber Monday (the Monday after Black Friday), everything was 25% off. During the entirety of Cyber Week Company X invests more money in advertising.

Black Friday

It is chosen to put an extra dummy variable for Black Friday, despite of it already being included in Cyber week. This because Black Friday is the day on which Company X sells the most products as can be seen in Figure 5. On Black Friday, Company X had the same deals as with the site wide weekends, so 20% off everything.

Singles Day

Singles Day is a day when stores and brand discount their items to celebrate people not in a relationship. Company X also participates with this. During Singles Day, all of the products are at least 11% off. Company X increases their budget during this day.

Christmas

The Christmas period is the most profitable period for Company X. This period ends a couple of days before Christmas, because if a customer would order after that date they would receive their package after Christmas. This is also something that Company X communicates. During this period not only the sales value and the branded searches are higher, but also the advertising budget.

Mother's Day

The Mother's Day period also is an important period for Company X. For this period the same applies as for the the Christmas period.

E-mail advertising

Company X sends an email on Monday and on Wednesday to people who are subscribed to the newsletter or who want to receive updates. Sending an email has an effect on the sales value. That is why there is chosen to include a dummy variable on every Monday and Wednesday.

3.2.3 Dependent Variables

As explained before, the dependent variables in this research are branded search and sales value. The number of branded searches and the sales value over time can be found in figure 4 and figure 5 respectively. There are different peaks in both figures. Those peaks are in the same periods as described in Appendix C. To account for the increase in both sales and branded searches the dummy variables described in section 3.2.2 were added.

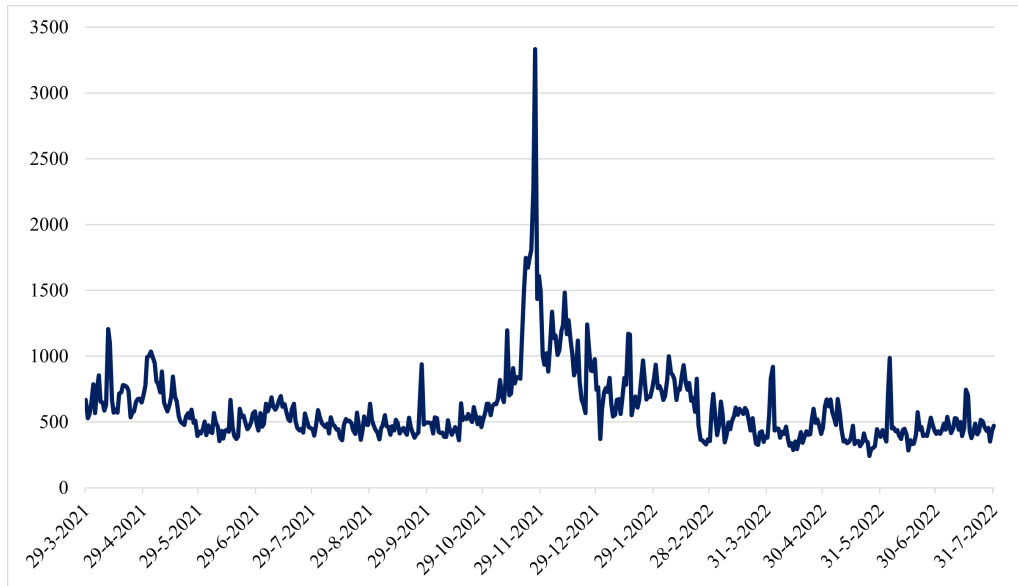


Figure 4: Branded Search

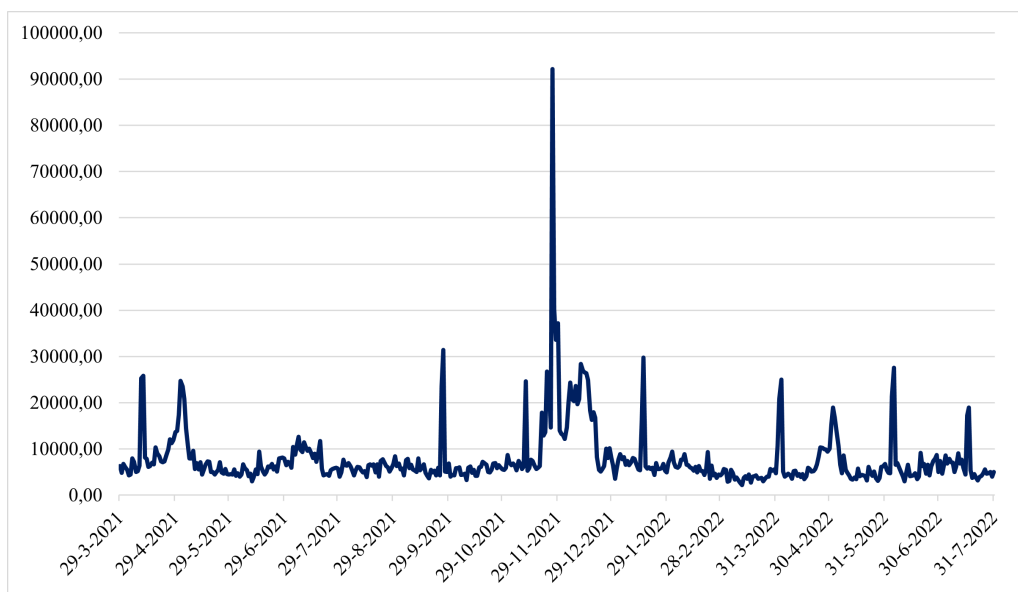


Figure 5: Sales Value

3.3 Data Preparation

The data gathered from SuperMetrics came from different sources so it was uploaded in different data files. First, those files were aggregated based on the date and then uploaded to SPSS. The data was first checked for missing values, but all the data was complete. In the sales data a drop in sales value was found on the 19th of May in 2021. When examining the rest of the data this does not make any sense. According to Company X, it is a known phenomenon that sometimes sales are not added up in the right way. The

amount of sales are then added to the next day. In order to straighten this out the sales values of 19-05-2021 and 20-05-2021 are added to each other and split equally into two. This sales value was then put on those dates.

4 Methodology

4.1 Model Specification

A system of equations was specified to explain the dependent variables in this research: sales value and the number of branded searches. This was done by following the steps of the mediation analysis by Baron and Kenny (1986). Based on different articles it was chosen to use a log-log model to explain the variables (Dinner et al., 2014; Burmester, Becker, van Heerde, & Clement, 2015; Guitart & Stremersch, 2021). The way the model parameters were estimated was by using ordinary least squares (OLS). After the log transformation the model is linear, which makes OLS an appropriate method. No instrumental variables were added to the model so a two or three-stage least squares estimation was not necessary.

4.1.1 Log-Log Transformation

The log-log model (also called power model) is a model with diminishing returns. A model with diminishing returns to scale is appropriate as it is expected that the sales value will increase when the amount of advertising spending increases, but that every extra Euro invested in advertising results in a lesser increase in sales value than the previous Euro invested. Log transformations are used in different models that have sales or search as a dependent variable (Dinner et al., 2014; Guitart & Stremersch, 2021; Burmester et al., 2015).

In order to prepare the data for a log-log regression, certain variables needed to be log transformed. Therefore, the natural logarithm was taken of the SMA variable, SEA variable and the dependent variables. It is impossible to log-transform dummy variables without any other adaptations, so the those variables will not be log-transformed. The other variables could be log-transformed without any problems, as they did not contain data points with a value of zero. A log-log model has the advantageous property that the coefficients of each variable can be directly interpreted as the elasticity of that variable (Hanssens, Parsons, & Schultz, 2003). If x is changed by 1%, y is expected to change by $\beta_1\%$.

4.1.2 Model Analysis

This research focuses on finding the indirect effects of advertising spend on branded search and branded search on sales. Also the direct effect of advertising spend on sales through branded search is examined. These effects can be captured by the undermentioned linear

models:

$$\begin{aligned} \ln BrandedSearch_t = & \beta_{1,0} + \beta_{1,1}SMAAdStock_t + \beta_{1,2}SEAAdStock_t \\ & + \beta_{1,3}ChristmasPeriodDummy_t + \beta_{1,4}MothersDayDummy_t + \mu_{1,t} \end{aligned} \quad (3)$$

There was chosen to not include all the different dummy variables in the branded search model (equation 3). The Christmas and Mother's Day period were added, because there was hypothesized that during those periods people will search more for Company X regardless of the advertising spend. There were also more branded searches during other periods given in appendix C, for example the site wide weekends. However, those were not added in the model, because the increase in searches can be completely attributed to the increase in advertising spend. The sales model can be captured by the following equation:

$$\begin{aligned} \ln Sales_t = & \beta_{2,0} + \beta_{2,1}SMAAdStock_t + \beta_{2,2}SEAAdStock_t + \beta_{2,3}\ln BrandedSearch \\ & + \beta_{2,4}SiteWideSaleDummy_t + \beta_{2,5}SummerSaleDummy_t \\ & + \beta_{2,6}WinterSaleDummy_t + \beta_{2,7}CyberWeekDummy_t + \beta_{2,8}BlackFridayDummy_t \\ & + \beta_{2,9}ChristmasPeriodDummy_t + \beta_{2,10}MothersDayDummy_t \\ & + \beta_{2,11}EmailMondayDummy_t + \beta_{2,12}EmailWednesdayDummy_t \\ & + \beta_{2,13}SMACopula_t + \beta_{2,14}SEACopula_t + \mu_{2,t} \end{aligned} \quad (4)$$

From these linear models, different effects can be found. The direct effect is the effect of the adstock variables on the sales controlled for branded search. The direct effect of SMA on sales is $\beta_{2,1}$ and the direct effect of SEA on sales is $\beta_{2,2}$. The indirect effect is the effect of the adstock variables on sales due to branded search. The indirect effects of SMA and SEA on branded search are $\beta_{1,1} * \beta_{2,3}$ and $\beta_{1,2} * \beta_{2,3}$ respectively. The total effect is the sum of the direct and the indirect effect. In order to find the standard error and the significance of both the total and the indirect effect bootstrapping was used, as the bootstrap test is most of the time more powerful than Sobel's test (Zhao, Lynch Jr, & Chen, 2010). The amount of repetitions of the bootstrap was 5000.

4.1.3 Stock Variables

A possible way of modelling advertising effects is by adstock modelling (Broadbent & Fry, 1995). Adstock, at a given point in time, is the cumulative value of the advertising of a brand. Adstock can also be described as goodwill. When a company or a brand

advertises it creates a stock of consumer goodwill, however, this stock also subsequently decreases over time (Dinner et al., 2014). An adstock variable can also be described as an exponential smoothing of the advertising variable (Danaher, Bonfrer, & Dhar, 2008). To be able to model adstock a constant fraction needs to be found. This fraction, also called the carry-over parameter, is the amount of advertising effort that is taken to the next period (Hanssens et al., 2003). Based on several articles the following equations were defined for the adstock variables (Danaher et al., 2008; Guitart & Stremersch, 2021):

$$SMAAdStock = \lambda_{SMA}SMAAdStock_{t-1} + (1 - \lambda_{SMA})ln(SMA_t) \quad (5)$$

$$SEAAAdStock = \lambda_{SEA}SEAAAdStock_{t-1} + (1 - \lambda_{SEA})ln(SEA_t) \quad (6)$$

To be able to find the first adstock variables to initialize equations 5 & 6, the following equations were used.

$$SMAAdStock_t = \lambda_{SMA}SMA_{t-1} + (1 - \lambda_{SMA})ln(SMA_t) \quad (7)$$

$$SEAAAdStock_t = \lambda_{SEA}SEA_{t-1} + (1 - \lambda_{SEA})ln(SEA_t) \quad (8)$$

The data used in this research starts on 29-03-2021. However, Company X already started advertising before that date. To account for previous advertising effects the adstock variables were calculated initialized from 01-01-2021. In order to find the carry-over parameter (λ_j), a grid search was performed. For both adstock variables a grid search needs to be performed when varying (λ_j) from 0 to 0.90 in steps of 0.10. This means that in equation 4 all possible combinations with the different values for λ_{SMA} and λ_{SEA} were tested. This resulted in $10^3 = 100$ combinations being tested. The λ_j was chosen based on which combination of λ_{SMA} and λ_{SEA} resulted in the model with the highest adjusted R^2 (see equation 9). The models that were compared have the same dependent variable. This makes the adjusted R^2 a reliable measure of goodness of fit between the different models.

4.2 Model Validation

Face Validity

The first step of the model validation was to check the face validity of the model. It was checked whether the model measured what it was intended for. In this step, there was also controlled if the parameters had the signs that were expected and the significance of the different independent variables were checked.

Model Fit

After that the model fit was analyzed with the adjusted R^2 . The goal was to have the highest adjusted R^2 while still having a valid model. The R^2 is a measure that can vary between 0 and 1 and it is the fraction of the variations of the dependent variable that can be explained by the independent variables in the model (Hanssens et al., 2003). The R^2 is a value that can increase when adding more variables. That is why there is chosen to examine the adjusted R^2 . The adjusted R^2 is calculated with the following equation:

$$AdjustedR^2 = R^2 - \frac{k-1}{n-k}(1 - R^2) \quad (9)$$

Another measure of forecasting performance that was used was the mean squared error (MSE) (equation 10).

$$MSE = \frac{1}{n} \sum_{i=1}^n (Y_i - \hat{Y}_i)^2 \quad (10)$$

Where Y is the actual value and \hat{Y} is the predicted value. The MSE was used to give more weight to larger errors. The smaller the MSE the better the fit. The values of the dependent variables are relatively small, because they were log transformed. That is why a small MSE was expected. The forecasting performance was also visualized by making a graph with both the actual and the predicted value of the dependent variable.

Normality

There are different properties of the error term that were examined as the error terms need to be independent and identically distributed. One of the assumptions for OLS that needs to hold is normality of the error term. There is a sufficiently large sample set so there can be considered that the central limit theorem holds. That is why there was not checked for normality as the central limit theorem states that if the sample size gets larger, the means of the sample approximates a normal distribution.

Multi-collinearity

The different models had multiple independent variables. This means that there was checked whether multi-collinearity was present. This was first done by studying the correlations between the different independent variables (see appendix ??). As a threshold a correlation higher than 0.8 was considered as a high correlation. To further test for multi-collinearity, the variance inflation factor (VIF) was calculated. If the VIF was below 5 it was assumed that the multi-collinearity was not problematic enough to remove

the variable from the model.

4.3 Endogeneity

An assumption of OLS that needs to hold is that there is no endogeneity, which can appear when there are omitted variables. There are reasons to believe that endogeneity might arise in the sales model. People in charge of advertisement spending could have used personal information regarding how consumers respond to marketing actions to decide on the advertising costs. There needed to be accounted for this choice, because otherwise the model could suffer from endogeneity (Luan & Sudhir, 2010). No appropriate instrumental variables were found so there was made use of the Gaussian copula approach, which is an instrument-free method (Park & Gupta, 2012). With the Gaussian copula approach an extra variable is added to the model to control for endogeneity. These variable were calculated as follows:

$$SMAAdStock_t^* = \Phi^{-1}(H(SMAAdStock_t)) \quad (11)$$

$$SEAdStock_t^* = \Phi^{-1}(H(SEAdStock_t)) \quad (12)$$

Where $SMAAdStock_t^*$ and $SEAdStock_t^*$ are the copula terms, $H(SMAAdStock_t)$ and $H(SEAdStock_t)$ are the empirical cumulative density functions of $SMAAdStock$ and $SEAdStock$ and Φ^{-1} is the inverse normal cumulative distribution function. For the identification of endogeneity it is important that the adstock variables are not normally distributed (Park & Gupta, 2012). The non-normality was confirmed by doing a Shapiro-Wilk test (Burmester et al., 2015) ($SMAAdStock = 0.81$, $p < 0.001$, $SEAdStock = 0.96$, $p < 0.001$). When adding the Gaussian copula the copula term is an estimate. This implies that the standard errors from the OLS are incorrect. To get the appropriate standard errors a bootstrapping method needed to be applied (Rutz & Watson, 2019).

5 Results

5.1 Adstock

The first step of the analysis was finding the carryover coefficients (λ) of both SMAAd-Stock and SEAdStock. There was found that for both adstock variables $\lambda = 0.10$. This is a relatively low carryover (Dinner et al., 2014), which suggest that the impact of both SMA and SEA is felt almost immediately.

5.2 Branded Search Model

5.2.1 Face Validity

Table 3 shows the result of the branded search model. The model shows that SMA costs are positively associated with the number of branded search impressions ($b = 0.35$, two-sided $p < 0.001$; two-sided tests are used throughout). SEA costs also have a positive and significant association with branded search ($b = 0.23$, $p < 0.001$). This suggests that both forms of advertisements stimulate the recognition of need for the brand in the customers, which results in more branded searches. The effect of the Christmas period on the amount of branded searches is positive ($b = 0.37$, $p < 0.001$). It would be expected that during gifting periods there is searched more for products that could be gifted. The effect of the two forms of advertisements on branded search was needed for finding the indirect effect.

Table 3: Branded Search Model

Independent Variable	b	S.E	p-value
SMA Adstock	0.35	0.04	<.001
SEA Adstock	0.23	0.03	<.001
Christmas Dummy	0.37	0.06	<.001
Mother's Day Dummy	-0.10	0.06	0.10

5.2.2 Model Fit

In figure 6, the difference can be found between the actual number of branded searches and the model-predicted branded search. The R is 0,77 and the adjusted R² is 0,59. The model has an MSE of 0.054, which is low as was expected. Multi-collinearity is not a problem, because all of the VIF values are below 5.

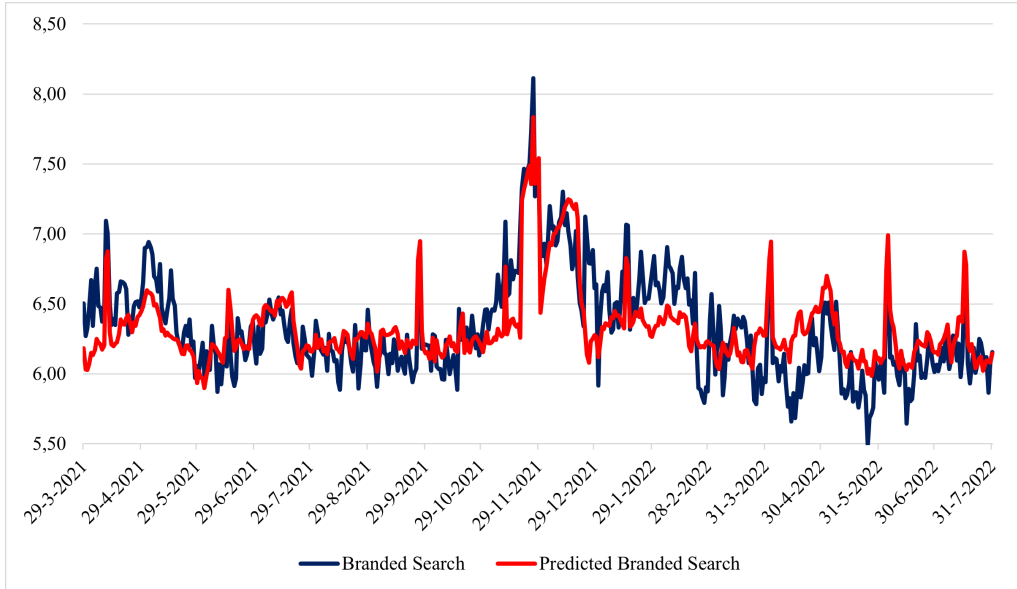


Figure 6: Observed VS Predicted LN(Branded Search)

5.3 Sales Model

5.3.1 Face Validity

First, the dummies variables are discussed and their impact on sales to judge the face validity. As it was expected, the site wide sales have a significant positive effect ($b = 0.56$, $p = <0.001$) on the sales value, suggesting that during those weekends the value of the sale per day is higher. The summer ($b = 0.22$, $p = <0.001$) and winter ($b = 0.08$, $p = 0.05$) sale also have a significant positive effect. The cyber week has a significant negative effect ($b = -0.43$, $p = 0.02$) on the sales value, which is surprising at first, because it would be expected that a discount period would have a positive effect on the sales value. An explanation for this could be that during cyber week, different items were discounted per day. If relatively cheap items (e.g. jewelry) were discounted that day it could be that more items were sold, however those items had a lower value. Also not all of the deals during cyber week were as successful. Another explanation for this could be that during cyber week the costs of advertising are higher. This entails that with the same advertising budget a less big audience can be reached. Both Black Friday ($b = 0.62$, $p = <0.001$) and Singles Day ($b = 0.68$, $p = <0.001$) have a positive significant effect. This is as expected, because on both days all of the items on the website are on sale. Also both gifting periods, Christmas ($b = 0.65$, $p = <0.001$) and Mother's Day ($b = 0.34$, $p = <0.001$), have a significant and positive effect. The emails that are sent on both Monday ($b = 0.09$, $p = <0.001$) and Wednesday ($b = 0.06$, $p = 0.03$) positively influence the amount earned in sales.

There are Gaussian copula added to the model so the model was tested by bootstrapping. The model was set to 5000 bootstrap samples. The SMA adstock copula is significant, which highlights the importance of controlling for endogeneity (Park & Gupta, 2012).

Table 4: Sales Model

Independent Variable	b	S.E	p-value (2-tailed)
SMA Adstock	0.47	0.17	0.00
SEA Adstock	0.38	0.17	0.02
ln Branded Search	0.39	0.04	<.001
Site Wide Sale Dummy	0.56	0.11	<.001
Summer Sale Dummy	0.22	0.03	<.001
Winter Sale Dummy	0.08	0.04	0.04
Cyber Week Dummy	-0.43	0.19	0.03
Black Friday Dummy	0.62	0.14	<.001
Singles Day Dummy	0.68	0.07	<.001
Christmas Dummy	0.57	0.06	<.001
Mother's Day Dummy	0.36	0.06	<.001
Email Monday Dummy	0.09	0.03	0.00
Email Wednesday Dummy	0.05	0.02	0.02
Copula (SMA Adstock)	-0.10	0.04	0.02
Copula (SEA Adstock)	-0.03	0.07	0.73

5.3.2 Model Fit

In figure 7 the observed sales value can be seen compared to the predicted sale value. The vertical axis is the log scale of the sales value and the horizontal scale are the dates over the 16 month period. The R of the model is 0.93 and the R^2 is 0.87. For the adjusted R^2 equation 9 was used. The total model is significant ($p < 0.05$) which indicates that the model statistically significantly predicts sales value (i.e is a good fit for the data). The model has an MSE of 0.034. Multi-collinearity is not a concern, because all of the VIF values (excluding the copula variables) are below five.

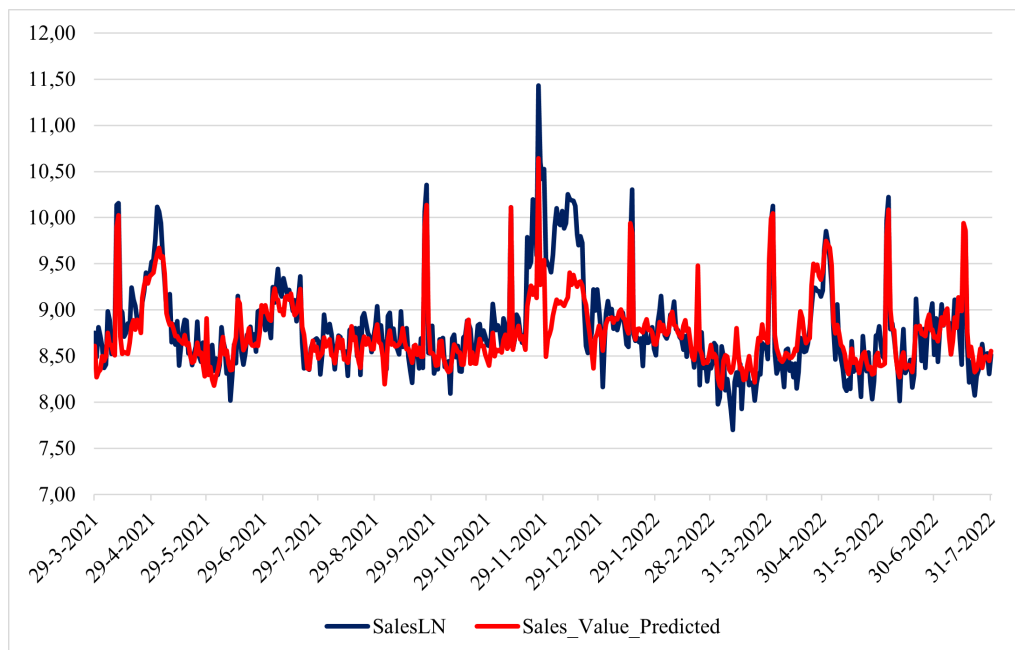


Figure 7: Observed VS Predicted LN(Sales Value)

5.4 Total Model

5.4.1 Direct Effect

The direct effect, in this research, is the effect of both adstock variables on sales controlled for branded search. In table 4 there can be found that types of advertising are positively and significant related to sales. SMA's direct effect on the value of sales is 0.47 ($p = 0.00$). The direct effect of the amount spend on SEA on sales is 0.38 ($p = 0.02$). There is expected that spending more on advertisement has a positive influence on the sales value, which is supported by this model.

5.4.2 Indirect Effect

The indirect effect, in this case, is the effect of the adstock variable on the sales value through the number of branded searches. The indirect effects can be found in table 5. The indirect effect of SMA on the sales value is positive and significant ($b = 0.14$, $p < .001$). SEA also has a positive indirect effect on sales. This effect is also significant ($b = 0.09$, $p < .001$).

Table 5: Indirect Effect

Independent Variable	b	S.E	Z-value	p-value
SMA Adstock	0.14	0.024	5.65	<.001
SEA Adstock	0.09	0.015	6.17	<.001

5.4.3 Total Effect

As explained in the section 4.1.2 the total effect is direct effect plus the indirect effect. All of the direct and indirect effects are positive making, which makes total effect larger than the other effects. In table 6 the total effects of both forms of advertising on sales can be found. There can also be seen that all of the effects are significant.

Table 6: Total Effect

Independent Variable	b	S.E	Z-value	p-value
SMA Adstock	0.60	0.18	3.38	0.00
SEA Adstock	0.47	0.17	2.67	0.01

Based on all of the results described in this chapter the conceptual model looks as follows:

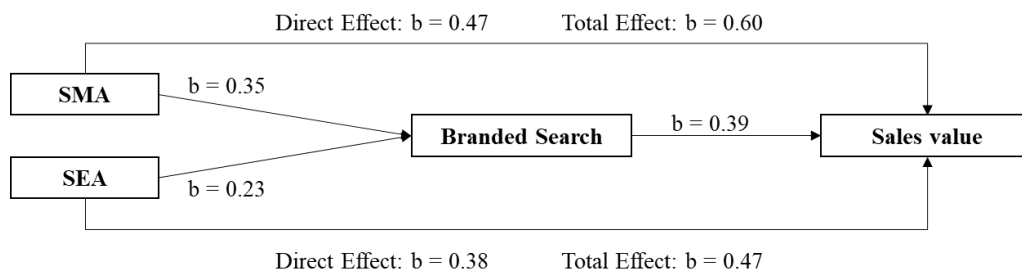


Figure 8: Conceptual Model with Results

6 Discussion

The aim of this research was to find the relation between two different forms of online advertising on sales and what the role of branded search is on that. This chapter discusses the research results and the implications. Subsequently, limitations and possibilities for future research are presented.

6.1 Hypotheses

To answer the research question defined in section 1.2.3, hypotheses were formulated using literature in section 2. This section discusses and evaluates the hypotheses defined by connecting it to the results of the empirical research presented in section 5.

6.1.1 H1a & H1b: SMA/SEA and Branded Search

Both hypotheses 1a and 1b can be found in section 2.1. There it was hypothesized that both SMA and SEA are positively related to branded search. The data of Company X supports this. Section 5.2, shows that both types of advertisements have a positive and significant effect on branded search. This research shows that if the amount spend on SMA is raised with 1% then the mount of branded searches increases with 0.35%. The influence of SEA is slightly less. If the amount invested in SEA is raised with 1% then the number of branded searches increases with 0.23%. In section 2.1, it was hypothesized that SMA would stimulate branded search in the same way as television advertising and display advertising did, which is confirmed.

This research has also confirmed the finding by Rutz and Bucklin (2011) that generic search spills over into branded search. Both of the situations that are sketched in section 1.2 are backed up by the results and the literature found in this research. It also makes sense that advertisements lead to branded searches. If a person would see an advertisement with a product on it that they would be interested in it makes sense that they would want to search for more information regarding this product. This search will most likely be done with a branded search.

There is still the discussion of why the effect on branded search is bigger for SMA than for SEA. This could have multiple reasons. The first one being that when clicking on an advertisement on, for example Instagram, a person does not leave Instagram. The website opens on the social media page. If someone wants to leave the social media page and end up on the "regular" website they could perform a branded search to end up there. The other reason why the number of branded searches resulting from SEA might be lower

is the fact that people have already found Company X through a generic search. When a potential customer found Company X through a certain generic search term and later they want to return to the website of Company X. They know that they can also type in the generic search term, because that will also result in the advertisement of Company X being shown.

6.1.2 H2a & H2b: SMA/SEA and Sales

Both hypotheses H2a and H2b can be found in section 2.2. As described in that section, advertising has a positive effect on the amount sold. This is also supported by the results of this research. This research shows that both SMA and SEA have a positive effect on the amount that is sold. For Company X, every 1% increase in SMA or in SEA, results in a 0.47% or 0.38% increase in sales, respectively. This research supports the claim by Godes and Mayzlin (2009) that investing in SMA has a positive effect on the amount of sales a company makes.

It was not expected that SMA had a larger impact on the sales value than SEA. Both types of advertising can stimulate some recognition of need. A SMA could stimulate the need, for example, for a watch. Due to the fact that SMA is a FICs it could be possible that a person had never thought about buying a watch before seeing the advertisement. Such potential customers are further away from a purchase as they need to first recognise their need for a watch and subsequently consider the brand before buying. It could also be possible that a person sees the advertisement and takes no action, because they do not need a watch. For SEA this is different. In order to be shown an advertisement of Company X on the search page someone needed to have already searched for something that already holds some kind of relation to Company X, like "women's' watch". The recognition of need has already happened. The only choice that still needs to be made is where they are going to buy the product.

6.1.3 H3: Branded Search and Sales

Hypothesis 3 is supported both according to literature and the data by Company X. The suggestion that a branded search term is already quite specific and that there is a large chance that a customer searching for a more specific search term has a higher purchase intention (Montgomery et al., 2004) is supported. The effect of branded search on sales, in the case of Company X, is the following. If there are 1% extra branded searches there is a 0.39% increase in the sales value at Company X.

There is not only a direct effect of the branded searches on sales, but also an indirect effect. This means that both SMA and SEA influence the sales value through branded search. Branded search intervenes the relation between advertising and sales. This means that the following situation does occur: customers see the Company X advertisement on their search page or on social media and search for Company X stimulated by that advertisement. This leads the customer to the Customer X website, where they make a purchase.

6.2 Conclusion

In the introduction of this research the following research question was formulated:

RQ. *What is the influence of SMA and SEA on sales and what is the influence of branded search in this relation?*

With the support of all of the hypotheses the research question can be answered. More spending on SMA and SEA leads to a higher sales value. By also adding the number of branded searches that are a result of the advertisements the total effect on sales is higher. By finding these results this research is both relevant for Company X and it has theoretical relevance. This research not only confirms that generic search engine advertisements can lead to branded searches, but that also advertisements on social media lead to branded searches.

6.3 Limitations and Future Research

There are a couple of limitations in this research. The first being that there was no data available regarding the advertising spending of competition. This could have been added to make the model more complete as it is expected that the amount that competition spends on advertising does influence the amount that Company X sells in two ways. First it could have a negative effect as potential customers could switch to the competitor, however, competitor advertisements could also have a positive effect as they could stimulate the recognition of need in customers (Schultz & Wittink, 1976). In future research it would be interesting, not only for Company X, but also for theory to add the advertising spending of competitors. In this case there could be tested whether competitive advertising redirects customers or if it stimulates a recognition of need.

Another limitation is that, as explained in section 1.3, it was only possible to get the sales result relating to the online sales of Company X via their own website. This is not the full sales value of Company X products as their products can also be bought online

and offline at other stores. In Dinner et al. (2014) was found that there is a cross-selling effect of online search on offline sales. This cross-selling effect could not be tested in this research as the necessary data was not available. In future research it would be interesting to take into account cross selling.

This research only included data that was gathered from Google. However, there are also other types of search engine on which there can be advertised and people can search on. In the article by Rutz and Bucklin (2011) a distinction is made between Google and Yahoo. In the future this research can be expanded so investigate whether different search engines have the same effect on branded search and sales.

6.4 Managerial Implications

This research has given a more complete overview of how different forms of online advertising relate to sales. It is expected that the outcomes of this research can be expanded to other similar types of companies. These are companies that have their own website where they only sell their own brand and they do not have a physical store. For these companies there are different types of implications that can be taken from this research.

This research shows that branded search is an antecedent of sales value. One positive aspect of branded searches is that it is a construct that is relatively easy to get data about. With the use of Google trends or Google Search Console companies can analyse how much there is searched for their brand or for competing brands. With this companies can make an estimate on how they are performing in the market and compare it to their competitors. By comparing the number of branded searches of different companies within the same segment a estimation can be made of which company has the highest sales value.

This research compares two types of advertising. This is something that can be taken into account when companies decide on how to divide their advertising budget. What is found in this research is that SMA has a larger impact on both the number of branded searches and the sales value than SEA. What this implies for companies is that it is more effective to invest a larger part of their budget to SMA and a smaller part to SEA.

6.5 Theoretical Contribution

The theoretical contribution from this research is the addition of branded search in the relation between both SMA and SEA on sales. The previous literature was limited to the relation between SEA and branded search (Rutz & Bucklin, 2011), without including

Google shopping. Previous research has found the relation between SEA, branded search and sales (Dinner et al., 2014), however this research did include offline advertising and did not include any form of SMA. This research also includes a check for endogeneity, which is not the case in the research by Dinner et al.(2014).

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Appendices

A Example: Google Search & Shopping

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Figure 9: Example of Google Search

Advertenties · horloge vrouwen kopen

 <p>Dames horloge Laura, ... € 119,00 Holzkern Gratis verzen... ★★★★★ (40) Van Google</p>	 <p>UITVERKOOP Uniseks - Mercer Horloge - Ros... € 69,50 €99 Rosefield Gratis verzen... ★★★★★ (203) Van DEPT®</p>	 <p>Dames - Rond horloge witte... € 49,95 My Jewellery +€ 3,95 verze... Van Bigshopper</p>	 <p>Dames - Gerecycled... € 49,99 Lucardi Juwelier Gratis verzen... ★★★★★ (64) Van Producth...</p>	 <p>CLUSE Dame Horloge - Boh... € 89,95 Cluse Official W... Gratis verzen... ★★★★★ (1k+) Van Producth...</p>
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Figure 10: Example of Google Shopping

B Branded Keywords

[Company X schmuck] "schmuck Company X" Company X schmuck" "Company X kette"
"halskette Company X" "kette Company X" "Company X halskette" "Company X hals-
ketten" "Company X ketten" [halsketten Company X] [Company X halsketten] "halsket-
ten Company X" "ketten Company X" "ohrringe Company X" "Company X ohrringe"
[ohrring Company X] [Company X ohrring] "ohrring Company X" "Company X ohrring"
[uhrenarmband Company X] "armbanduhr Company X" "uhrenarmband Company X"
[uhrarmbänder Company X] [uhrenarmbänder Company X] "uhrarmbänder Company
X" "uhrenarmbänder Company X" [sale Company X] "sale Company X" [Company X
adventskalender] "adventskalender Company X" "Company X adventskalender" "Com-
pany X kalender" "Company X weihnachtskalender" "weihnachtskalender Company X"
[adventskalender Company X] [Company X kalender] [Company X weihnachtskalender]
[weihnachtskalender Company X] [rabattcode Company X] "rabattcode Company X"
"Company X rabatt" [Company X] "Company X" "Company X uhr" [Company X
uhr] [Company X damenuhren] "damenuhr Company X" "uhr Company X" "Com-
pany X damenuhren" [uhren damen Company X] "uhren damen Company X" [Company
Xwatches] [watches Company X] "Company X watch" "Company Xwatches" "watch
Company X" "Company X armband" "Company X armbänder" "armband Company X"
"armbänder Company X"

C Promotion dates

Table 7: Promotion Dates

Promotion type	Date
Site Wide Sale	10-04-21;11-04-21, 25-09-21;26-09-2021, 15-01-22;16-01-2022, 01-04-22;03-04-22, 04-06-22;05-06-22 16-07-22;17-07-22
Summer Sale	15-06-21;19-07-21, 20-06-22;15-07-22
Winter Sale	28-12-21;14-01-22
Cyber Week	20-11-21;29-11-21
Black Friday	26-11-2021
Singles Day	11-11-2021
Christmas	20-11-21;20-12-21
Mothers day	25-04-21;06-05-21, 24-04-22;04-05-22

D Correlation Table

Table 8: Correlations

Variable	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.
1. Sales	-													
2. Branded Search	0.76**													
3. SMA	0.74**	0.69**												
4. SEA	0.82**	0.63**	0.63**											
5. Site Wide	0.36**	0.20**	0.41**	0.21**										
6. Summer Sale	0.06	-0.12*	-0.01	0.05	-0.07									
7. Winter Sale	0.02	0.10*	0.02	0.02	-0.04	-0.07								
8. Cyber Sale	0.39**	0.47**	0.57**	0.32**	-0.03	-0.05	-0.03							
9. Black Friday	0.23**	0.22**	0.28**	0.15**	-0.01	-0.02	-0.01	0.31**						
10. Singles Day	0.12**	0.10*	0.11*	0.06	-0.01	-0.02	-0.01	-0.01	0.00					
11. Christmas	0.60**	0.59**	0.55**	0.43**	-0.05	-0.10*	-0.05	0.56**	0.17**	-0.01				
12. Mothers Day	0.30**	0.11*	0.08	0.46**	-0.04	-0.09	-0.05	-0.03	-0.01	-0.01	-0.06			
13. Email Monday	0.10*	0.08	-0.02	0.11*	-0.04	0.01	-0.2	0.02	-0.02	-0.02	0.01	0.01		
14. Email Wednesday	-0.01	-0.05	-0.05	-0.02	-0.07	0.01	0.01	-0.02	-0.02	-0.02	-0.01	0.01	-0.17**	-

**p<0.01; *p<0.05