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The impact of complimentary advertising strategies on sponsored search advertisement

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ABSTRACT

The aim of this research was to find relationships between complimentary advertising strategies and sponsored search advertisement (SSA) in order to formulate a model to maximise return on investment achieved from online sponsored search advertisements. The results obtained from statistical analyses of SSA campaign data showed that complimentary online and offline advertisement campaigns have various different correlations to impressions, click-through rates, number of pages visited, time spent visiting a website, bounce rate of visitors to the website, cost-per-click and number of new registrations per keyword search from visitors gained through SSA campaigns.

In particular, online display advertisements were found to have a slight positive correlation with *new registrations* made by customers gained through a simultaneously running SSA campaign. Offline radio adverts were found to have a positive correlation with *impressions* gained for SSA campaigns, whilst at the same time showing a negative correlation with the *number of pages viewed* by website visitors obtained through the SSA campaign. Some negative correlations to SSA campaign performance were also found, with the *time* visitors *spent* viewing the website decreasing, their bounce rate increasing and the *cost-per-clicks* for the keywords in the SSA campaign also increasing during periods when offline radio adverts were active. Offline television adverts were found to have a negative correlation with *impressions* gained for SSA campaigns, as well as the *click-through rate* for the keywords in these SSA campaigns. Offline television adverts did however also show a negative correlation with the *cost-per-clicks* for keywords in the SSA campaigns.

Finally, a graphical model was developed to illustrate these correlations found between complimentary advertisement campaigns and SSA performance metrics.

KEYWORDS

Online Marketing

Sponsored Search Advertisement (SSA)

Impressions

Click-Through Rates (CTR)

Cost-per-Click (CPC)

DECLERATION

I declare that this research project is my own work. It is submitted in partial fulfilment of the requirements for the degree of Master of Business Administration at the Gordon Institute of Business Science, University of Pretoria. It has not been submitted before for any degree or examination at any other university. I further declare that I have obtained the necessary authorisation and consent to carry out his research.

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Etienne van der Linde
10 November 2010

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1 INTRODUCTION

1.1 Research Title

The impact of complimentary advertising strategies on sponsored search advertisement.

1.2 Research Problem

With the ever increasing usage of the internet (Akman and Mishra, 2010), the online advertising sector is overtaking television as the biggest advertising sector by market share (Interactive Advertising Bureau, 2009). World wide spend on internet advertisement is forecasted to increase to $150 billion by 2013 (Weide, 2009), with the adoption of e-marketing techniques shown to be positively associated with performance (Brodie, Winklhofer, Coviello and Johnston, 2007). Locally, internet access in South Africa grew by 11.9% in 2008 to reach a value of $788 million with 3.3 million subscribers (DataMonitor, 2009), and is set to expand even further with lowering connection costs and increasing access by enabling technologies. Seeking more return on their marketing spend, companies are shifting their strategy from predominantly display advertisement to contextual-targeted search advertisement (Barnes and Hair, 2009). With the dynamic and highly addressable nature of the internet, true targeted one-to-one advertising has become an affordable reality, allowing firms to deliver the right customised content to the right person at the right time (Ansari and Mela, 2003). The rise of multi-channel online advertisement has provoked the need from businesses to optimise their online marketing impact by applying the most effective mix of online and offline advertising strategies and therefore the need to know what influence certain delivery channels have on others.

In the early days of online advertisement, the struggle was to recognise what the numbers generated by online ads actually meant, followed by numerous studies to determine the single-channel effectiveness within an online advertising campaign (Robinson, Wysocka and Hand, 2007; Nutley, 2005). As historical data were accumulated, success and failure due to specific online advertisement characteristics, like creativeness (Rosenkrans, 2009) or exposure time (Lin and Chen, 2009), could slowly be identified, and direct comparison between online and offline advertising campaigns could be made (Preiffer and Zinnbauer, 2010). For e-Commerce enabled companies, the synergy between the two general mediums are viewed as one where offline campaigns create brand awareness, whilst online campaigns attract and convert potential customers (McMains and Morrissey, 2009). Research efforts on the moderating effects between two simultaneous advertising campaigns using different channels have been scarce. Naik and Raman (2003) used a Kalman filtering methodology to explore the synergy between television and print advertisements, but did not include online advertising methods in their research. One recent study did find potential advantages of cross-medium advertising over single-medium by investigating the combined effectiveness of an online (banner) and offline (print) campaign (Wakolbinger, Denk and Oberecker, 2009).

With the increasing role of search engines in online activity, trust, and buying decisions of consumers, search engine marketing (SEM) has become a major tool for driving traffic to a website (Sen, 2005). Sponsored search advertising (SSA) offers a more targeted approach to SEM, and increases a consumer's awareness of and exposure to a product or brand, possibly leading to adoption or purchase (Ghose and Yang, 2009). Little information is however available on the possible synergy between an SSA campaign and simultaneously employing other online and offline marketing channels.

The current challenge for companies following an SEM strategy is to obtain the most effective mixture of complimentary advertising campaigns that will maximise their direct response from sponsored search ads measurable by click-throughs (Hollis, 2005). A more meaningful indicator of campaign success will be the number of click-throughs translating to actual business success, measurable by the number of new registrations or sold products (Pfeiffer and Zinnbauer, 2010). Furthermore, the quality of the visitor traffic generated by the various marketing mixes need to be compared. Visitors portraying increased engagement with the product or service, and more efficient exposure to branding efforts, will involve greater depth (time per page) and lower breadth (total number of pages) (Huang, Lurie and Mitra, 2009).

1.3 Research Objectives

In light of the problem defined above, this research will investigate the effects of secondary online and offline advertisement campaigns on a primary sponsored search advertisement campaign. The research objectives include the following:

- Objective 1: To determine if a complimentary advertisement campaign will yield significantly more impressions for a particular sponsored search advertisement campaign.
- Objective 2: To determine if a complimentary advertisement campaign will yield significantly higher click-through rates for a particular sponsored search advertisement campaign.
- Objective 3: To determine if a complimentary advertisement campaign will yield significantly improved visitor behaviour for a particular sponsored search advertisement campaign.

- Objective 4: To determine if a complimentary advertisement campaign will yield significantly lower cost for a particular sponsored search advertisement campaign.
- Objective 5: To determine if a complimentary advertisement campaign will yield significantly improved sales for a particular sponsored search advertisement campaign.

The research will however not consider any effects on key brand performance indicators or other purchase drivers (Rubinson and Pfeiffer, 2005).

1.4 Research Aim

The aim of this research is to find a relationship between complimentary advertising strategies and sponsored search advertisement in order to formulate a model to maximise return on investment achieved from online sponsored search advertisements. The aim is therefore to find a theoretical approach to the selection of complimentary advertising strategies in order to achieve specific results from a sponsored search campaign, whether it is to improve brand awareness, increase sales, or lower cost.

2 LITERATURE REVIEW

2.1 Introduction

This section will give an overview of the current academic knowledge on advertisement strategies with a focus on sponsored search advertisement, non-sponsored search advertisement, display advertisement and offline advertisement methods. Combining some of these strategies will then be reviewed, followed by a discussion on indicators that can be used to measure success in online advertisement.

The internet provides a permanent record of brand-related communications and is dominated by user-generated content, and can therefore be used by marketers to get a deep understanding of consumer relationships with brands (Aggarwal and Vaidyanathan, 2005). The empirical study performed by Kink and Hess (2008) found that search engines, compared to the traditional alternatives, are gratifying a wider spread of users' information needs. Search engines try to give some good results for everyone instead of focusing on complete result sets for a specific user type (Lewandowski, 2008). Dai (2007) however protests that the biggest concern with the growing number of internet users relying on search engines for their information needs is its quality rather than quantity. Conti (2008) highlights some concerns over the large-scale accumulation of personal, sensitive data that search engine firms gain when their services are used, whilst Poritz (2007) argues that even data stripped of personal information can be used to generate a moment-by-moment view of what is on the collective mind.

The ever increasing prevalance of the internet in human life resulted in a similar exponential growth in internet advertisement (Weide, 2009). The internet provides a dynamic and highly addressable way to perform true targeted one-to-one advertising (Ansari *et al.,* 2003). The internet allows for detailed measurement of response, where the audience's control of whether to pursue more information on an advertised subject can be traced in each step (Bhatnagar and Papatla, 2001).

Sponsored search advertising (SSA) forms the biggest part of online advertisement today, enabling advertisers to target an unprecedented number of potential customers according to behaviour, and not demographics, at much more affordable rates than traditional marketing channels (Jansen, 2007). Iyer, Soberman and Villas-Boas (2005) showed that the profitability of targeted advertising is still increasing due to improved information on consumers and their consumption habits. They concluded that targeted advertising will yield improved results gained for firms from their marketing spend. Section 2.2.1 will provide an in-depth study on the current body of knowledge on sponsored search advertisement, and how it can be applied in business.

2.2 Types of Advertisement

Currently there exist about eight different online business models, which can be categorised into two major revenue-generating schemes:

- Generate revenue through selling advertising
- Generate customers through buying advertising

Online advertising is an effective means of generating revenue and generating traffic to a business website. Different types of online advertising models exist, which a business can utilise to suit their needs (Josey, 2009). The types of advertising include:

- Paid advertising models
  - Pay-per-Click (PPC) / Cost-per-Click (CPC): Advertisers pay when their ad is clicked on (see section 2.2.1). Dinev, Qing and Yayla (2008) argues that advertisers' attitudes and subjective norms significantly influence their intention to advertise online using the pay-per-click model, including trust in search engine providers and third-party monitoring and filtering tools.
  - Pay-per-Impression (PPI) / Cost-per-Impression (CPM): Advertisers pay for every appearance of their ad on a web page. The cost for each impression is generally fixed at a fraction of a cent. Fjell (2010) however found that the optimal amount of advertising under pure PPI is decreasing in market power.
  - Pay-per-Action (PPA) / Cost-per-Action (CPA): Advertisers enter into an affiliate program, where they pay per sale of their product. Cudmore, McCoy, Shuhy and Taylor (2009) proposed a cost-per-action advertising model as an engaging and cost-effective alternative to the traditional static cost-per-click advertising model.
  - Cost-per-Lead (CPL): Only cost the purchaser money if a qualified lead is generated on the basis of the ad.

- Free advertising models
  - Article submission: submitting an article to other websites in return for a link to your own.
  - Ad-exchange: advertising a complimentary product or service from an identified partner in exchange for similar advertisement space on the partner's site.

- Search Engine Ranking: perform search engine optimisation (SEO) in order to rank highly for keywords that your target market might search for (see section 2.2.2).

Apart from the normal benefits received from any kind of advertising, including improved customer communication and brand awareness, online advertising provide specific benefits (Josey, 2009):

- *Cost effectiveness*: Online advertising is results-driven (Hoffmann and Novak, 2000).
- *Targeted*: Due to the underlying technology it is easy to reach a specific reader, and differentiate according to geography, areas of interest and context of the content. Brand name recall has been shown to be higher when advertisements are presented in a content-relevant internet environment (Yaveroglu and Donthu, 2008). One of the major challenges for targeted advertising is finding the customers most likely to be interested in the product or service a firm is advertising (Kim, Street, Russell and Menczer, 2005). The extreme case of targeted advertising is personalised one-to-one marketing, allowing firms to communicate directly with all customers based on their behaviour (Ferguson and Hlavinka, 2006). It attracts more attention and fosters loyalty, whilst aiding customers with decisions and reducing information overload (Ansari *et al.,* 2003). Targeting can be based on browser history, the content of the page currently being viewed or a users search preference (Sherman and Deighton, 2001). An improved ability to target customers however also increases the concentration of advertising firms in each market (Bergemann and Bonatti, 2010).
- *Reach*: A much wider audience can be reached online.

- *Measurable*: The technology also provides reporting and analysis functionality, enabling the measurement of click-through rate, page impressions and cost per sale whilst providing comprehensive evidence of the return on investment.
- *Immediate response*: Consumers can immediately click on a link to access more information, make a direct purchase or register for updates and services.

2.2.1 Sponsored search advertisement

Sponsored search advertisement is a form of contextual targeted advertisement making use of a CPC model, where users are invited to express interest in a product or service by clicking on a text ad displayed according to the context of the search text entered into the search engine (Fain and Pedersen, 2006; Jansen and Mullen, 2008). Ads are matched to the search context via “ad words” submitted by the advertiser together with the advert text and link (Iyer *et al.,* 2005).

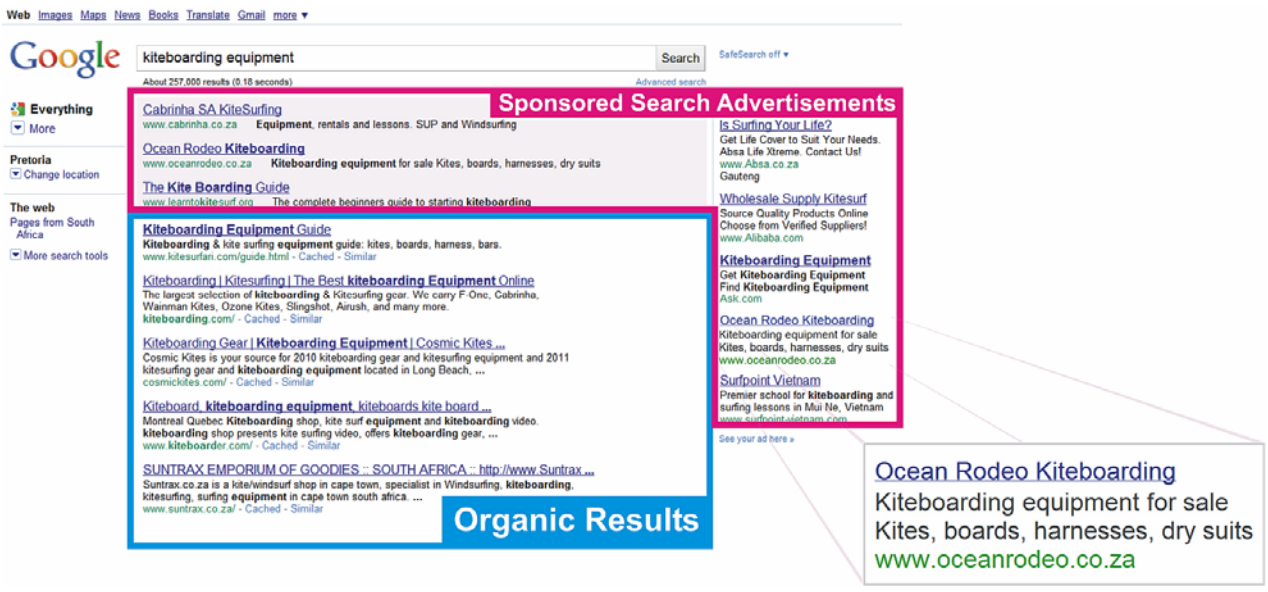


Figure 1: Example of a Sponsored Search Advertisement (SSA) on a Google SERP

Sponsored search advertisement allows individual level targeting towards consumers when they enter the market for a product (start searching), and also allows advertisers to track the consumers' actions online providing accurate measurement of profitability (Wilbur and Yi, 2009). Figure 1 shows an example of a sponsored search advertisement on a Google generated Search Engine Results Page (SERP).

For sponsored search advertisement, advertisers need to specify which keywords to include in a campaign, what the maximum bid should be for each keyword (since the pricing model is based on CPC), the design of the text advert, and finally the design of the landing page where the browser will be taken when the advert is clicked on (Rutz and Bucklin, 2007). Figure 2 provides the structure of a sponsored search advertisment campaign hosted on Google AdWords.

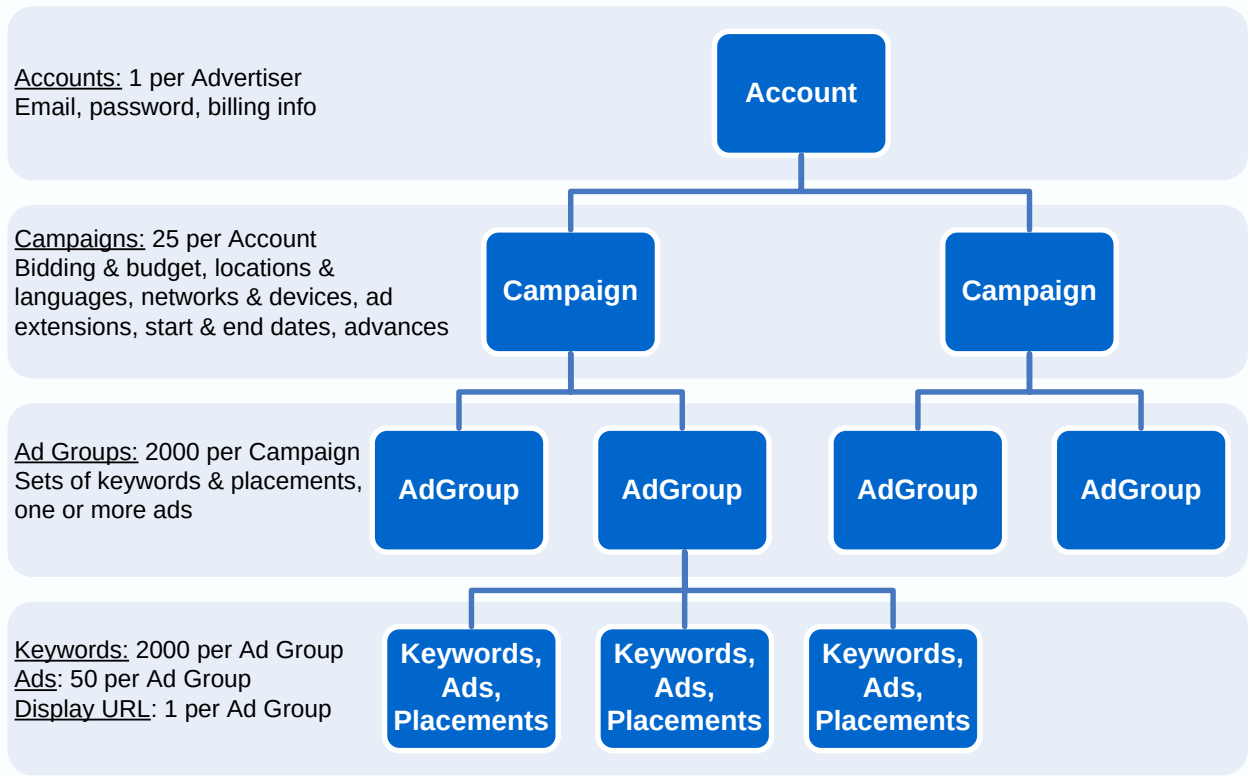


Figure 2: Structure of Google AdWord SSA campaigns

Sponsored search has proven to be a successful business model for search engines and online advertisers (Jansen, 2007), who auction off keywords to advertisers by use of a Generalised Second-Price (GSP) auction model (Delman, Ostrovsky and Schwarz, 2007). Chen, Liu and Whinston (2009) derived an optimal share structure for the keywords auctioned by advertising providers based on price elasticity of demand for exposure, their valuation distribution, total resources, and minimum bids. Mehta, Saberi, Vazirani and Vazirani (2007) in turn lays claim on an optimal algorithm that search engines can use for ad-selection in order to maximise revenue. Feng, Bhargava and Pennock (2007) modelled several mechanisms for allocating sponsored slots and devised a rank-revision strategy to modify rank allocations over time in order to maintain user attention and sponsored search revenues. The growth of sponsored search advertising can be ascribed to the reduced risk offered by its pay-per-click model for small advertisers (Mahdian and Tomak, 2008). When internet users are knowledgeable of sponsored links and hold a favourable attitude towards them, the positive impact on click intention is reinforced (Gauzente, 2010).

Keyword selection can be argued to be a dynamic form of metatagging, which focuses on associating possible search terms with specific websites and pages within these sites (Jansen *et al*., 2007). This keyword selection can be designed according to long tail principles in order to improve return on investment by increasing click-through rates and reducing cost-per-click (Adriaanse, 2009).

Click fraud is the practice of deceptively clicking on search ads with the intention of either increasing third-party website revenues or exhausting an advertiser's budget. Click fraud is a growing concern for pay-per-click (PPC) advertising programs, so much that Matin

(2007) investigated possible legal, regulatory and market-based solutions to consider in handling click fraud. Midha (2008) derived an ethical behavior model for developing strategies to curb this problem, whilst Wilbur *et al.* (2009) proposed the use of a neutral third party to audit search engines' click fraud detection algorithms.

2.2.2 Non-sponsored search advertisement

There is a strong preference for non-sponsored links (organic results), with searchers viewing these results first more than 82% of the time (Jansen and Resnick, 2006). Figure 1 shows where the organic results are displayed on a Google generated Search Engine Results Page (SERP). Searching self-efficacy and experience does not increase the likelihood of viewing sponsored links, and the order of the result listing does not appear to affect searcher evaluation of sponsored links (Jansen *et al.,* 2006). Dou, Lim, Su, Zhou and Cui (2010) identified key contextual factors that are conducive for creating brand positioning online via search engine results pages (SERPs) for non-sponsored links. They also found that internet users with little search skills tend to evaluate unknown brands more favourably and that feature priming increases the importance of display order in SERPs.

Malaga (2008) states that 62% of search engine users click only on the results that appear on the first page of the SERP, leading to businesses using search engine optimization techniques to improve their probability of appearing on the first page of a SERP. Users will, in general, tend to click on top results over results lower down the list, though this tendency should not be as strong when the relevance of the top results is weakened (O'Brien and Keane, 2007). By use of page ranking, search engines tend to

retrieve and display stored pieces of information in response to a query in a similar manner that human memory would (Griffiths, Steyvers and Firl, 2007). Search engines that rely on histories of previous user choices or linkage-based algorithms for SERP rankings could misleadingly over-promote an initially popular page due to re-incursive preferential clicks on the higher placed items by users (Keane, O'Brien and Smyth, 2008).

2.2.3 Display advertisement

Graphical advertisements featured on websites are known as Display Ads or Banner Ads. Display ads are often available in many standard shapes and sizes, including: banners, leader boards, skyscrapers, large boxes, and other sized graphical ads (Shakya, 2008) where the designers engage in an imaginary dialogue with their audience (Fourquet-Courbet, Courbet and Vanhuele, 2007). Lohtia, Donthu and Hershberger (2003) found that medium coloured and animated banners provided high CTR's, which were again confirmed by Chen, Ross, Yen and Akhapon (2009). Interactive display advertisements surprisingly does the opposite, with Yoo and Kim's (2005) results showing that high-animation conditions lead to subjects experiencing negative thoughts with inhibited recognition performance.

Banner spaces are usually sold by impressions, or banner views, but it is sometimes sold by click-throughs, when you pay only when the user clicks on the banner. Other forms of display ads include flash and video ads, pop-ups, floating ads, interstitial ads and take-over ads (Aggarwal, 2007). Chatterjee (2005) did not find any improvements in CTR's by repeating banner ads. Rosenkrans (2009) proved that interactive ads exhibit higher levels of interactivity and click-through rates than non-interactive ads. Yaveroglu *et al.* (2008)

however concluded that a repetition strategy delivers improved results in a competitive internet environment, whereas a variation strategy for banner-ads only leads to higher brand name recall and intention to click in a non-competitive internet environment. Dahlen (2001) found that advertisements for familiar brands tend to wear out quickly, whereas banner ads for unfamiliar brands need multiple exposures to wear in. He also argues that novice users are more affected by banner ads than are expert users.

Display advertisements have been found to not necessarily increase the click-through rate (CTR) to a website, but on a longer term generate meaningful increases in site visitation and both online and offline sales (Fulgoni and Mörn, 2009). It was found that display advertising increases the probability of a consumer to conduct a search using the advertiser's branded terms by 38%, whilst increasing the probability of purchasing the advertised brand online by 27% and offline by 17% (Fulgoni *et al*., 2009). Manchanda, Dubé, Goh and Chintagunta (2006) has shown that banner advertising has a positive effect on repeat internet purchase probabilities, specifically the number of exposures, number of websites and number of pages the banner features on. The level of congruency between an advertised product and the content of the webpage it is displayed on play significant roles in affecting consumers' responses to incidentally exposed banner ads (Yoo, 2009).

Consumers have however grown increasingly annoyed with online advertising, resorting to software and restrictive web browser settings in an attempt to reduce pop-up ads and other marketing strategies (Taylor, Loiacono and Watson, 2008). McCoy, Everard, Polak and Galleta (2007) developed a methodology for web designers to determine the

appropriate amount of advertisement on a website in order not to interfere with the user's ability to remember the site's content.

E-mail advertising is also a form of display advertising. Martin, Van Durme, Raulas and Merisavo (2003) however found that its effectiveness in creating direct sales is limited, but that repeated exposure can create brand awareness.

2.2.4 Offline advertisement

The best advertising methods have traditionally been newspapers, radio and television, but all these have seen changes in trends over the years. Some other radical offline methods include large helium balloons, colourful mobile signs, humans dressing in costumes and promoting a product, airplanes towing advertising banners, painted water tanks or other large structures, smoke and aroma of food being prepared in restaurant kitchens propelled through vents and unfortunately telemarketers (Barnes, 2010). The effectiveness of magazine advertisement is in constant decline, with the exception of magazines with high reach at high frequencies (Collins, Dixon, Eadie, Reggimenti, Shiffman and Soukhareva, 2010). The monotone message given to all consumers by traditional media no longer meets business requirements due to the growing sophistication of consumers (Kazienko and Adamski, 2007).

Ilfeld and Winer (2002) have concluded that offline advertising will increase direct site visitation through the significant influence on consumer awareness. Rojas-Méndez and Davies (2005) argued that an increasing number of consumers try to avoid television advertisements.

Where the internet is build on a many-to-many communications model, traditional media is based on a one-to-many model (Hoffmann *et al.*, 2000). Rust and Varki (1996) argued that interactive media, such as the internet, will functionally displace traditional mass media, because interactive media will be better able to serve the communication needs of individuals. The intemet used to be ineffective for stimulating emotions, and less effective than other media at incorporating attention-getting devices and changing attitudes (La Ferle, Edwards and Wei-Na, 2000). A few years later, Graham and Havlena (2007) found that both online and offline advertising models still have significant impact on consumer behaviour, but states in some earlier research that brand awareness generated in online consumers decay much faster (Havlena and Graham, 2004).

2.3 Combining Strategies

Companies have been employing a variety of online and offline methods to improve their branding profiles, which included communication vehicles like newspapers, radio, magazines, television, public relations, trade events and promotions, personalised e-mail notifications, affiliate programmes with other websites and banner advertisements (Ibeh, Ying and Dinnie, 2005). It is crucial for any advertising medium, be it print, radio, television or internet, to reach a core targeted audience in order to maximise the return in placing advertisement in the particular medium (Chandra, 2009). Wakolbinger *et al.* (2009) studied the potential advantages of cross-medium advertising over a single-medium by investigating the combined effectiveness of an online (banner) and offline (print) campaigns. They concluded that combined online and offline advertising strategies do not exhibit improved effectiveness.

Ha (2003) analysed the advertising strategies of leading U.S. TV networks' websites and online portals, which respectively represent websites with strong offline media support and websites with no offline media counterparts. She found that TV websites were much more moderate in their display of advertising than online portals and use primarily brand integration as their convergence strategy in advertising recruitment.

2.4 Advertisement Success Indicators

Pfeiffer *et al*. (2010) advocates that online advertising campaign success can be measured by the number of click-throughs translating to actual business success (number of new registrations / sold products). Furthermore, Huang *et al*. (2009) postulated that the quality of the visitor traffic generated by the various marketing mixes can be inferred from the exposure a visitor has to the targeted website, where greater depth (time per page) and lower breadth (total number of pages) translates to desirable behaviour.

An impression is a single display of a particular advert on a webpage, with some advertising hosts charging fees based upon the number of impressions (CPM model). There is however no standard way to count impressions, leading to some attempts to standardise the measurement of online advertising impressions (Carysforth, 2005). Early studies on online marketing found a strong correlation between impressions gained by online advertisements and visitors gained to targeted websites (Mack, 2000).

Click-through rates (CTR's) are a fast and easy measure of the success of an online advertising campaign (Hollis, 2005). CTR's can be seen as an immediate response to an

advertisement, or a request for further information (Chandon, Chtourou and Fortin, 2003). Yoo (2008) has argued that a single exposure to advertisement is already beneficial to the advertiser, regardless of whether a click-through was generated. He confirmed that consumers build a more favourable attitude towards a brand unconsciously exposed to through banner-ads regardless of the levels of attention they paid to the advertisements, and were more likely to include the advertised brand in their consideration set than those who had no exposure. This was countered by Ilfeld and Winer's (2002) argument that online advertisement has the purpose of generating web-traffic and not brand awareness. Drèze and Hussherr (2003) however found that CTR's are an ineffective measure of banner-ad performance because surfers actually avoid looking at banner ads during their online activities. They also found that banner-ads still have an impact on traditional memory-based measure of effectiveness improving brand recognition and awareness, and therefore the performance of banner-ads needs to be measured by brand-equity indicators rather than CTR's. Bucklin and Sismeiro (2009) highlights a number of inherent limitations of clickstream data for understanding and predicting the behavior of internet users or researching marketing phenomena.

An improved indication of the quality of a click generated by an advertisement can be measured by visitor behaviour after the click-through has occurred, in terms of frequency of visits, time spent on site (TS), bounce rate (BR) and number of pages viewed (PV) (Hoffman *et al.*, 2000). The bounce rate (BR) is defined as the percentage of users that view only one page per session. Lin, Jen-Hwa, Sheng and Lee (2010) also found a positive correlation between the time spent visiting a website and purchases made, and also between purchasing behaviour and the number of webpages viewed at a site during a visit. Danaher, Mullarkey and Essegaier (2006) concluded that older people and

females tend to visit websites for longer periods. Wolk and Theysohn (2007) found that the number of visitors to a website employing paid-for online advertisement strategies is directly and positively influenced by the quality of the offering, interactivity, accessibility, and relevance while the number of page views is positively influenced by credibility, interactivity, personalisation and navigation.

In conjunction with CTR, the *cost-per-click* (CPC) metric provides advertisers with the ability to measure the consumer's response and how it is charged for (Hoffman *et al*., 2000). Agencies and advertisers appear to be moving increasingly from online advertising models where pricing is based on exposure toward models where payment is based on performance (Fulgoni *et al*., 2009). The ease of use, low cost and transparency of CPC makes it a very attractive model employed by most search engines today (Edelman, Ostrovsky and Schwarz, 2007). In order to maximise return on investment for a CPC based advertising model, a firm should aim to get the maximum number of quality leads for a given budget by reducing the cost-per-click (CPC).

2.5 Conclusion

With sponsored search advertising (SSA) offering firms the desired one-to-one advertising at affordable rates (Ansari *et al*., 2003), search engine marketing (SEM) has become the dominant tool for driving online sales (Sen, 2005). Little information were however found during this literature study on simultaneously employing other online and offline advertising channels together with sponsored search advertising campaigns, and the possible synergies that can be achieved by such multi-channel approaches. The current challenge for companies following an SEM strategy is to obtain the most effective

mixture of complimentary advertising campaigns that will maximise their direct response from sponsored search ads measurable by click-throughs (Hollis, 2005).

3 RESEARCH HYPOTHESES

3.1 Introduction

This section describes the purpose of the research to be undertaken. The relation between secondary online and offline advertisement campaigns and the results achieved from a primary sponsored search advertisement (SSA) campaign needs to be researched. The return to be made from the different SSA marketing campaigns will be measured by the number of click-throughs obtained directly from the SSA and subsequent sales or sign-ups actuated from these click-throughs (Pfeiffer *et al.,* 2010). The quality of visitors generated from the different SSA marketing campaigns will be measured by the time spent by visitors viewing pages, and the number of pages viewed (Huang *et al.,* 2009). The bounce rate (BR), defined as the percentage of users that view only one page per session, also acts as a quality indicator of visitor behaviour (Hoffman *et al.*, 2000).

- Objective 1: To determine if a complimentary advertisement campaign will yield significantly higher *impressions* for a particular sponsored search advertisement campaign.
- Objective 2: To determine if a complimentary advertisement campaign will yield significantly higher *click-through rates* for a particular sponsored search advertisement campaign.
- Objective 3: To determine if a complimentary advertisement campaign will yield significantly improved *visitor behaviour* for a particular sponsored search advertisement campaign.

- Objective 4: To determine if a complimentary advertisement campaign will yield significantly reduced *cost* for a particular sponsored search advertisement campaign.
- Objective 5: To determine if a complimentary advertisement campaign will yield significantly higher *sales* for a particular sponsored search advertisement campaign.

Each of these objectives will be covered in more detail in the following sections.

3.2 Objective 1: Influence of Complimentary Adverts on Impressions

The first research objective is to determine whether a complimentary advertisement campaign will yield significantly higher impressions for a particular sponsored search advertisement campaign.

3.2.1 Impressions: Online Adverts

The null hypothesis under the first research objective states that *impressions* will remain the same when a complimentary online advertisement campaign is implemented. The alternative hypothesis states that *impressions* will significantly improve when a complimentary online advertisement campaign is implemented:

Null hypothesis: *Impressions* (IMP) obtained *with* a complimentary online advertisement campaign (on+) is equal to i*mpressions* obtained *without* a complimentary online advertisement campaign (on-):	$H1_0$:	$IMP_{on+} = IMP_{on-}$ $\therefore\ IMP_{on+} - IMP_{on-} = 0$
Alternate hypothesis: *Impressions* (IMP) obtained *with* a complimentary online advertisement campaign (on+) is significantly more than i*mpressions* obtained *without* a complimentary online advertisement campaign (on-):	$H1_a$:	$IMP_{on+} > IMP_{on-}$ $\therefore\ IMP_{on+} - IMP_{on-} > 0$

3.2.2 Impressions: Offline Adverts

The first research objective also requires an investigation into whether a complimentary offline advertisement campaign will yield significantly higher *impressions* for a particular sponsored search advertisement campaign. This null hypothesis under the first objective states that *impressions* will remain the same when a complimentary offline advertisement campaign is implemented. The alternative hypothesis states that *impressions* will significantly improve when a complimentary offline advertisement campaign is implemented:

Null hypothesis: *Impressions* (IMP) obtained *with* a complimentary offline advertisement campaign (off+) is equal to *impressions* obtained *without* a complimentary offline advertisement campaign (off-):	$H2_0$:	$IMP_{off+} = IMP_{off-}$ $\therefore\ IMP_{off+} - IMP_{off-} = 0$
Alternate hypothesis: *Impressions* (IMP) obtained *with* a complimentary offline advertisement campaign (off+) is significantly more than *impressions* obtained *without* a complimentary offline advertisement campaign (off-):	$H2_a$:	$IMP_{off+} > IMP_{off-}$ $\therefore\ IMP_{off+} - IMP_{off-} > 0$

3.3 Objective 2: Influence of Complimentary Adverts on Click-Through Rates

The second research objective is to determine whether a complimentary advertisement campaign will yield significantly higher *click-through rates* for a particular sponsored search advertisement campaign.

3.3.1 Click-Through Rate: Online Adverts

The null hypothesis under the second objective states that *click-through rates* will remain the same when a complimentary online advertisement campaign is implemented. The alternative hypothesis states that *click-through rates* will significantly improve when a complimentary online advertisement campaign is implemented:

Null hypothesis: *Click-through rates* (CTR) obtained *with* a	$H3_0$:	$CTR_{on+} = CTR_{on-}$

complimentary online advertisement campaign (on+) is equal to *click-through rates* obtained *without* a complimentary online advertisement campaign (on-):		$\therefore$ $CTR_{on+} - CTR_{on-} = 0$
Alternate hypothesis: *Click-through rates* (CTR) obtained *with* a complimentary online advertisement campaign (on+) is significantly more than *click-through rates* obtained *without* a complimentary online advertisement campaign (on-):	$H3_a$:	$CTR_{on+} > CTR_{on-}$ $\therefore$ $CTR_{on+} - CTR_{on-} > 0$

3.3.2 Click-Through Rate: Offline Adverts

The second research objective also requires an investigation into whether a complimentary offline advertisement campaign will yield significantly higher *click-through rates* for a particular sponsored search advertisement campaign. This null hypothesis under the second objective states that *click-through rates* will remain the same when a complimentary offline advertisement campaign is implemented. The alternative hypothesis states that *click-through rates* will significantly improve when a complimentary offline advertisement campaign is implemented:

Null hypothesis: *Click-through rates* (CTR) obtained *with* a complimentary offline advertisement campaign (off+) is equal to *click-through rates* obtained *without* a complimentary offline advertisement campaign (off-):	$H4_0$:	$CTR_{off+} = CTR_{off-}$ $\therefore$ $CTR_{off+} - CTR_{off-} = 0$
Alternate hypothesis: *Click-through rates* (CTR) obtained *with* a complimentary offline advertisement campaign (off+) is significantly more than *click-through rates* obtained *without* a complimentary offline advertisement campaign (off-):	$H4_a$:	$CTR_{off+} > CTR_{off-}$ $\therefore$ $CTR_{off+} - CTR_{off-} > 0$

3.4 Objective 3: Influence of Complimentary Advertisements on Visitor Behaviour

The third research objective is to determine whether the behaviour of visitors gained through complimentary advertisement methods yield better results than those obtained without them. Visitor behaviour will be measured by *number of pages* viewed, *time spent* viewing the website and the *bounce rate* of visitors to the website. Huang *et al. (*2009) found that visitors portraying increased engagement with the product or service, and more efficient exposure to branding efforts, will involve greater depth (time per page) and lower breadth (total number of pages). Table 1 shows how these different variables may relate to each other on a more abstract level, from which six hypotheses can be derived:

Table 1: Behavioural measures related to complimentary advertisement methods

Complimentary method:	**Behavioural measure:**		
	Number of pages	Time spent	Bounce Rate
Online Advertisement	Hypothesis 5	Hypothesis 7	Hypothesis 9
Offline Advertisement	Hypothesis 6	Hypothesis 8	Hypothesis 10

3.4.1 Pages Visited: Online Adverts

The fifth null hypothesis states that the *number of pages* viewed by a visitor will remain the same when a complimentary online advertisement campaign is implemented. The alternative hypothesis states that the *number of pages* viewed by a visitor will significantly decrease with implementation of a complimentary online campaign:

Null hypothesis: the *number of pages* (PV) viewed by a visitor *with* a complimentary online advertisement campaign (on+) is equal to the *number of pages* viewed *without* a complimentary online advertisement campaign (on-):	$H5_0$:	$PV_{on+} = PV_{on-}$ $\therefore\ PV_{on+} - PV_{on-} = 0$
Alternate hypothesis: the *number of pages* (PV) viewed by a visitor *with* a complimentary online advertisement campaign (on+) is significantly less than to the *number of pages* viewed *without* a complimentary online advertisement campaign (on-):	$H5_a$:	$PV_{on+} < PV_{on-}$ $\therefore\ PV_{on+} - PV_{on-} < 0$

3.4.2 Pages Visited: Offline Adverts

The sixth null hypothesis states that the *number of pages* viewed by a visitor will remain the same when a complimentary offline advertisement campaign is implemented. The alternative hypothesis states that the *number of pages* viewed by a visitor will significantly decrease when a complimentary offline advertisement campaign is implemented:

Null hypothesis: the *number of pages* (PV) viewed by a visitor *with* a complimentary offline advertisement campaign (off+) is equal to the *number of pages* viewed *without* a complimentary offline advertisement campaign (off-):	$H6_0$:	$PV_{off+} = PV_{off-}$ $\therefore\ PV_{off+} - PV_{off-} = 0$
Alternate hypothesis: the *number of pages* (PV) viewed by a visitor *with* a complimentary offline advertisement campaign (off+) is significantly less than to the *number of pages* viewed *without* a complimentary offline advertisement campaign (off-):	$H6_a$:	$PV_{off+} < PV_{off-}$ $\therefore\ PV_{off+} - PV_{off-} < 0$

3.4.3 Time Spent: Online Adverts

The seventh null hypothesis states that the *time spent* viewing the website will remain the same when a complimentary online advertisement campaign is implemented. The alternative hypothesis states that the *time spent* viewing the website will significantly improve when a complimentary online advertisement campaign is implemented:

Null hypothesis: the *time spent* (TS) viewing the website *with* a complimentary online advertisement campaign (on+) is equal to the *time spent* viewing the website *without* a complimentary online advertisement campaign (on-):	$H7_0$:	$TS_{on+} = TS_{on-}$ $\therefore\ TS_{on+} - TS_{on-} = 0$
Alternate hypothesis: the *time spent* (TS) viewing the website *with* a complimentary online advertisement campaign (on+) is significantly more than the *time spent* viewing the website *without* a complimentary online advertisement campaign (on-):	$H7_a$:	$TS_{on+} > TS_{on-}$ $\therefore\ TS_{on+} - TS_{on-} > 0$

3.4.4 Time Spent: Offline Adverts

The eighth null hypothesis states that the *time spent* viewing the website will remain the same when a complimentary offline advertisement campaign is implemented. The

alternative hypothesis states that the *time spent* viewing the website will significantly improve when a complimentary offline advertisement campaign is implemented:

Null hypothesis: the *time spent* (TS) viewing the website *with* a complimentary offline advertisement campaign (off+) is equal to the *time spent* viewing the website *without* a complimentary offline advertisement campaign (off-):	$H8_0$:	$TS_{off+} = TS_{off-}$ $\therefore\ TS_{off+} - TS_{off-} = 0$
Alternate hypothesis: the *time spent* (TS) viewing the website *with* a complimentary offline advertisement campaign (off+) is significantly more than to the *time spent* viewing the website *without* a complimentary offline advertisement campaign (off-):	$H8_a$:	$TS_{off+} > TS_{off-}$ $\therefore\ TS_{off+} - TS_{off-} > 0$

3.4.5 Bounce Rate: Online Adverts

The ninth null hypothesis states that the *bounce rate* of visitors will remain the same when a complimentary online advertisement campaign is implemented. The alternative hypothesis states that the *bounce rate* will significantly decrease when a complimentary online advertisement campaign is implemented:

Null hypothesis: the *bounce rate* (BR) of visitors to the website *with* a complimentary online advertisement campaign (on+) is equal to the *bounce rate* of visitors to the website *without* a complimentary online advertisement campaign (on-):	$H9_0$:	$BR_{on+} = BR_{on-}$ $\therefore\ BR_{on+} - BR_{on-} = 0$
Alternate hypothesis: the *bounce rate* (BR) of visitors to the website *with* a complimentary online advertisement campaign (on+) is significantly less than the *bounce rate* of visitors to the website *without* a complimentary online advertisement campaign (on-):	$H9_a$:	$BR_{on+} < BR_{on-}$ $\therefore\ BR_{on+} - BR_{on-} < 0$

3.4.6 Bounce Rate: Offline Adverts

The tenth null hypothesis states that the *bounce rate* of visitors will remain the same when a complimentary offline advertisement campaign is implemented. The alternative hypothesis states that the *bounce rate* will significantly decrease when a complimentary offline advertisement campaign is implemented:

Null hypothesis: the *bounce rate* (BR) of visitors to the website *with* a complimentary offline advertisement campaign (off+) is equal to the *bounce rate* of visitors to the website *without* a complimentary offline advertisement campaign (off-):	$H10_0$:	$BR_{off+} = BR_{off-}$ $\therefore BR_{off+} - BR_{off-} = 0$
Alternate hypothesis: the *bounce rate* (BR) of visitors to the website *with* a complimentary offline advertisement campaign (off+) is significantly less than the *bounce rate* of visitors to the website *without* a complimentary offline advertisement campaign (off-):	$H10_a$:	$BR_{off+} < BR_{off-}$ $\therefore BR_{off+} - BR_{off-} < 0$

3.5 Objective 4: Influence of Complimentary Advertisements on Cost

The fourth research objective is to determine whether a complimentary advertisement campaign will result in significantly lower sponsored search advertisement campaign cost.

3.5.1 Cost-per-Click: Online Adverts

The null hypothesis under the fourth research objective states that *cost-per-click* will remain the same when a complimentary online advertisement campaign is implemented. The alternative hypothesis states that *cost-per-click* will significantly reduce when a complimentary online advertisement campaign is implemented:

Null hypothesis: *Cost-per-click* (CPC) obtained *with* a complimentary online advertisement campaign (on+) is equal to *cost-per-click* obtained *without* a complimentary online advertisement campaign (on-):	$H11_0$:	$CPC_{on+} = CPC_{on-}$ $\therefore CPC_{on+} - CPC_{on-} = 0$
Alternate hypothesis: Cost-per-click (CPC) obtained *with* a complimentary online advertisement campaign (on+) is significantly less than *cost-per-click* obtained *without* a complimentary online advertisement campaign (on-):	$H11_a$:	$CPC_{on+} < CPC_{on-}$ $\therefore CPC_{on+} - CPC_{on-} < 0$

3.5.2 Cost per Click: Offline Adverts

The fourth research objective also requires an investigation into whether a complimentary offline advertisement campaign will result in significantly lower sponsored search advertisement campaign cost. This null hypothesis under this objective states that *cost-*

per-click will remain the same when a complimentary offline advertisement campaign is implemented. The alternative hypothesis states that *cost-per-click* will significantly reduce when a complimentary offline advertisement campaign is implemented:

Null hypothesis: *Cost-per-click* (CPC) obtained *with* a complimentary offline advertisement campaign (off+) is equal to *cost-per-click* obtained *without* a complimentary offline advertisement campaign (off-):	$H12_0$:	$CPC_{off+} = CPC_{off-}$ $\therefore\ CPC_{off+} - CPC_{off-} = 0$
Alternate hypothesis: *Cost-per-click* (CPC) obtained *with* a complimentary offline advertisement campaign (off+) is significantly less than *cost-per-click* obtained *without* a complimentary offline advertisement campaign (off-):	$H12_a$:	$CPC_{off+} < CPC_{off-}$ $\therefore\ CPC_{off+} - CPC_{off-} < 0$

3.6 Objective 5: Influence of Complimentary Advertisements on Sales

The last research objective is to determine whether a complimentary advertisement campaign will yield significantly higher sales (products company) or sign-ups (services company) for a particular sponsored search advertisement campaign.

3.6.1 Sales: Online Adverts

The null hypothesis under the fifth objective states that *sales (new registrations)* will remain the same when a complimentary online advertisement campaign is implemented. The alternative hypothesis states that *sales (new registrations)* will significantly improve when a complimentary online advertisement campaign is implemented:

Null hypothesis: *New registrations* (NR) obtained *with* a complimentary online advertisement campaign (on+) is equal to *new registrations* obtained *without* a complimentary online advertisement campaign (on-):	$H13_0$:	$NR_{on+} = NR_{on-}$ $\therefore\ NR_{on+} - NR_{on-} = 0$
Alternate hypothesis: *New registrations* (NR) obtained *with* a complimentary online advertisement campaign (on+) is significantly more than *new registrations* obtained *without* a complimentary online advertisement campaign (on-):	$H13_a$:	$NR_{on+} > NR_{on-}$ $\therefore\ NR_{on+} - NR_{on-} > 0$

3.6.2 Sales: Offline Adverts

The fifth research objective also requires an investigation into whether a complimentary offline advertisement campaign will result in significantly higher sales gained from a sponsored search advertisement campaign. The null hypothesis under this research objective states that *sales (new registrations)* will remain the same when a complimentary offline advertisement campaign is implemented. The alternative hypothesis states that *sales (new registrations)* will significantly improve when a complimentary offline advertisement campaign is implemented:

Null hypothesis: *New registrations* (NR) obtained *with* a complimentary offline advertisement campaign (off+) is equal to *new registrations* obtained *without* a complimentary offline advertisement campaign (off-):	$H14_0$:	$NR_{off+} = NR_{off-}$ $\therefore\ NR_{off+} - NR_{off-} = 0$
Alternate hypothesis: *New registrations* (NR) obtained *with* a complimentary offline advertisement campaign (off+) is significantly more than *new registrations* obtained *without* a complimentary offline advertisement campaign (off-):	$H14_a$:	$NR_{off+} > NR_{off-}$ $\therefore\ NR_{off+} - NR_{off-} > 0$

4 RESEARCH METHODOLOGY

4.1 Research Methodology

A quantitative causal research methodology was used to identify cause-and-effect relationships between the readily quantifiable variables identified in section 3, following a pre-test-post-test group experimental design proposed by Zikmund (2003) to control the testing effect and other sources of extraneous variation. Results from two groups of sponsored search advertisement campaigns were compared where those campaigns in the experimental group implemented a complimentary advertising strategy (O_1) and those in the control group did not (O_2). Historical data from both groups (O_1 and O_2) was used to identify and compare campaign data after the complimentary advertising strategy had been implemented for the experimental group:

Experimental Group:	R	X	O_1
Control Group:	R		O_2

The dependent variables that were measured within these groups were the *impressions* gained by the SSA advert, *click-through rates* (CTR) and *cost-per-click* (CPC) gained through the advert, number of *pages viewed* (PV), *time spent* (TS) viewing the target website, *bounce rate* (BR) of visitors to the website and number of *new registrations* by users gained from the advert, whilst the presence (+) or absence (-) of secondary complimentary advertising campaigns was the independent variable, for both online (on) and offline (off) variations.

4.2 Unit of Analysis

The study specifically focused on sponsored search advertisement campaigns implemented by companies with online advertising strategies for one or multiple websites. Each SSA campaign consisted of one or multiple Ad Groups, which in turn consisted of identified keywords linked to advert text and cost-per-click information (see Figure 2). The first two objectives therefore made use of accumulative impression and click-through rate data analysed per keyword in the SSA campaign. The third objective used accumulative number of pages viewed per keyword, total time spent on a targeted website by visitors gained from keyword searches within the SSA campaign and the bounce rate of these visitor's sessions. The fourth objective used accumulated cost-per-click data for each of the keywords in the SSA campaign, whilst the last objective made use of the number of new registrations measured for each keyword in the SSA campaign. The duration of campaigns paired for comparison in the experimental and control groups were closely matched, with some comparisons being two week-long periods, and others being two month-long periods.

4.3 Population of Relevance

All sponsored search advertisement campaigns would ideally have been the population of reference. However, access to website statistical data were limited to a few targeted companies making use of SSA campaigns with Google AdWords, resulting in a sample-frame representing the above mentioned population. These companies were selected based on online presence and research accessibility.

4.4 Sampling Method and Size

Due to the limited access to companies' statistical data, all suitable SSA campaigns in the above-mentioned sample-frame were used in this study. Keywords within each available SSA campaign ranged from 1 000 up to 30 000 keywords that could be used in the analyses.

4.5 Data Collection Process

The targeted companies was contacted via e-mail or telephone and requested to share their website and SSA campaign statistical data and complimentary advertisement strategy information. A total of 16 companies were contacted, of which 5 responded positively, constituting a response rate of 31%. The data used in this research was obtained from an actual field environment, enhancing its external validity to other SSA campaigns in general.

Trace analysis was used through the collection of secondary data gathered from SSA and website statistics and company records on advertisement strategies to test the hypotheses detailed in Chapter 3. For click-through rates, click-through data obtained from Google AdWords was used, whilst number of pages viewed per campaign, time spent per campaign and the bounce rate were obtained from website statistical data or Google Analytics. These statistical engines make use of cookies to collect and track session data.

SSA results data for two distinct periods (one with complimentary advertisements active, and another without complimentary advertisements) were obtained from were obtained from the corresponding firms. In order to control for extraneous variables, the delay

between the two sample periods used ranged from two weeks to two months: enough for direct effects from complimentary advertisements to subside, but not too long in order to maintain constancy of conditions, allowing for the dependent variable (SSA campaigns from both periods) to be exposed to identical situations apart form the independent variable (absence or presence of complimentary advertisements).

Statistical and complimentary data obtained from responding companies was processed and merged into a single database repository for statistical analysis. Identifiers were stored with the data, but anonymous results will be represented in this report. In order to reduce the effect that keywords appearing only once in a datasets obtained for an SSA campaign may have on the results, only keywords appearing in all datasets (and hence used in all periods) of a responding firm's SSA campaign were used in the analysis. Keywords appearing in only one of the datasets were removed by use of a specially written program, resulting in final datasets containing only paired keywords.

4.6 Data Analysis Approach

Comparison of *impressions*, *click-through rates*, *pages viewed*, *time spent*, *bounce rate*, *cost-per-click* and *new registrations* between different groups resemble a cross-sectional study. Statistical analyses on the results were performed using NCSS (2007). In particular, paired T-tests (Albright, Winston and Zappe, 2009) between observations O_1 and O_2 for each of the result variables IMP, CTR, PV, TS, BR, CPC and NR were used to determine a statistically significant difference incurred by changing the independent variable; presence (+) or absence (-) of complimentary advertisements. When the two pairs (O_1 and O_2) of observations showed a statistically significant difference, a

conclusive relation could be proven between the independent variable (±) and the particular dependent variable under study (IMP, CTR, PV, TS, BR, CPC and NR).

4.7 Research Methodology Limitations

A sampling frame error may have occurred if the sample frame of targeted companies implementing SSA campaigns did not accurately represent the entire world population of sites implementing any kind of sponsored search advertisement, therefore influencing the external validity of the findings (Zikmund, 2003). This may be due to differences in how the targeted companies' potential website visitors react to complimentary advertisement compared to the rest of the population.

There was also a possibility of non-response error in terms of no contacts (when the desired targeted companies were unreachable) and refusals (when these companies / contact person felt no obligation to participate in the research). There also existed a possibility of social desirability bias, where statistical data provided by the company were deliberately falsified to present favourable popularity.

The use of historical data from different timelines exposed the research to a cohort effect, a special case of the history effect (Zikmund, 2003). A change in one of the dependent variables (IMP, CTR, PV, TS, BR, CPC and NR) could have been due to the fact that members (in this case internet users) of one experimental group / condition experienced different historical situations from those members of another experimental group / condition, like seasonal effects or major influencing events. Although implementing a causal design, this study did not attempt to exclude all other factors (extraneous

variables) that may have influenced IMP, CTR, PV, TS, BR, CPC or NR result measurements, therefore influencing the internal validity of the findings (Zikmund, 2003).

5 RESULTS

5.1 Introduction

This section will analyse SSA data obtained from various internet-based companies in order to investigate the research objectives set in Chapter 3. For each of the objectives, statistical data for a particular SSA campaign will be compared between two distinct periods: one where a complimentary advertisement campaign was active and the other where no complimentary advertisement campaign was running. Making use of statistical methods, each of these dataset comparisons will aim to prove the presence or absence of a significant difference between the SSA results obtained during each period, dependent on the influence of a complimentary marketing campaign.

5.2 Objective 1: Influence of Complimentary Adverts on Impressions

The null hypothesis under the first objective stated that *impressions* (IMP) obtained with a complimentary advertisement campaign are equal to *impressions* obtained without a complimentary campaign running. The alternative hypothesis stated that *impressions* obtained with a complimentary advertisement campaign are significantly higher than *impressions* obtained without a complimentary advertisement campaign.

5.2.1 Impressions: Online Display Adverts

SSA results data for two distinct periods (one with complimentary online display advertisements active, and another without complimentary online advertisements) were obtained from a prominent internet-based company making use of only online display advertisements at various stages. The dataset for the week long period when

complimentary online advertisements were running, contained 2045 keyword entries, whilst the dataset for the week long period when no complimentary online ads were running, contained 2104 keyword entries. In order to reduce the effect that keywords appearing in one dataset and not the other may have on the results, only keywords appearing in both datasets (and hence used in both periods) were used in the analysis, whilst keywords appearing in only one of the sets were removed (by use of a specially written program), resulting in a final dataset with 946 paired keywords.

Figure 3 shows a box plot frequency representation of the *impressions* for the keywords in the SSA campaign during which complimentary online display advertisements were active (IMP_{on+}), and the *impressions* for a similar duration when no complimentary online display advertisements (IMP_{on-}) were active.

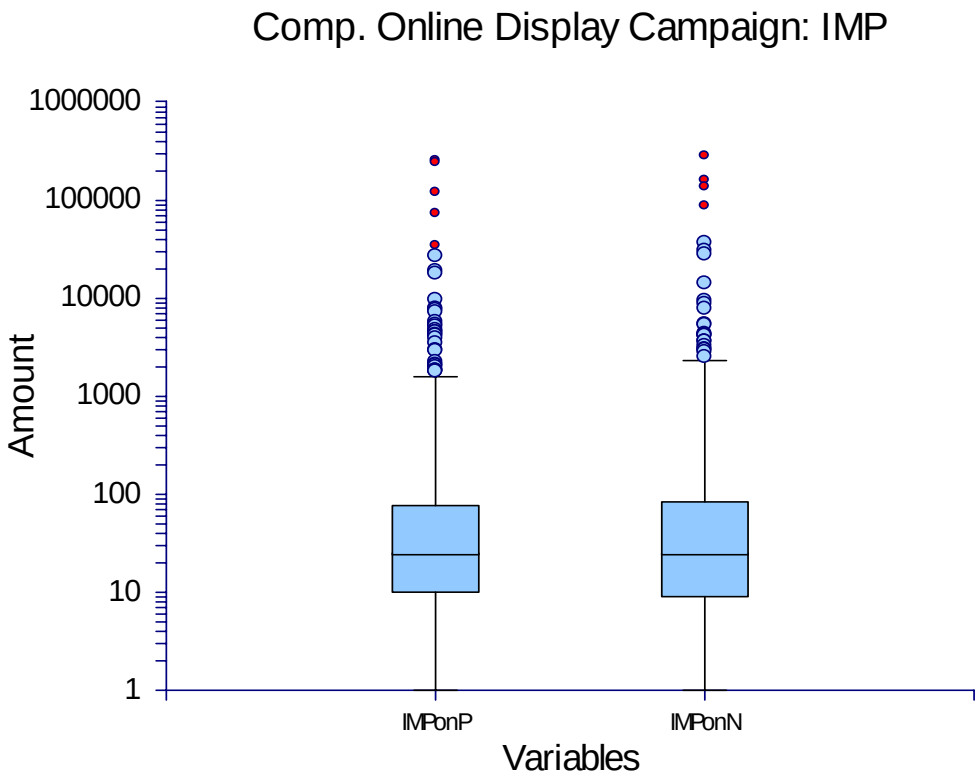


Figure 3: Box Plot comparing impression for campaigns with and without display ads

From this descriptive analysis, the *impressions* for both sets seem to be fairly similar, with IMP_{on+} having average *impressions* of 996.39 whilst IMP_{on-} has a 978.13 average.

With the sample size big enough ($n_1 = n_2 = 946 > 30$) to assume that the sampling distribution takes on a normal distribution, and impression entries in both sets for corresponding keywords, a paired T-Test was used to test for a statistically significant difference between the IMP_{on+} and IMP_{on-} datasets. The statistical output of this process is shown in appendix A.1.

For *difference* ($IMP_{on+} – IMP_{on-}$) $<>$ 0 under the Paired T-Test with $\alpha = 0.05$, the *p-value* is given as 0.851, and the null hypothesis $H1_0$ can not be rejected, meaning that **the two sample means (IMP_{on+} and IMP_{on-}) can not be statistically proven to be significantly different at the 10% level**. The T-Value of 0.1877 also indicates that the two sample means differ only with 0.2 standard errors.

We can therefore conclude that no statistical evidence exists to suggest that *impressions* for SSA campaigns making use of complimentary online display advertisements are different to *impressions* for SSA campaigns without complimentary online display advertisements.

5.2.2.1 Impressions: Offline Radio Adverts

The second null hypothesis under objective 1 also stated that *impressions* (IMP) obtained with a complimentary offline advertisement campaign (off+) is equal to *impressions* obtained without a complimentary offline advertisement campaign (off-). The alternative

hypothesis stated that *impressions* (IMP) obtained with a complimentary offline advertisement campaign (off+) are significantly more than *impressions* obtained without a complimentary offline advertisement campaign (off-).

To fulfil this objective, data from an internet-based company making use of SSA whilst supplementing it with intermittent radio adverts were used. SSA results data for four distinct week-long periods were obtained. During two of these sample periods the company ran complimentary offline radio advertisements, whilst the samples for the periods when no complimentary offline advertisements ran, were taken two weeks after the initial two periods respectively. The four datasets contained 2500 independent keyword entries for the periods. In order to reduce the effect that keywords appearing in one dataset and not the others may have on the results, only keywords appearing in all four datasets (and hence used in all four periods) were used in the analysis, whilst keywords appearing in only one of the sets were removed (by use of a specially written program), resulting in a final dataset with 1164 keywords.

Figure 4 shows a box plot frequency representation of the *impressions* for the keywords in the SSA campaign during two periods in which complimentary offline radio advertisements were running (IMP_{off+}), and the *impressions* for a similar duration when no complimentary offline radio advertisements (IMP_{off-}) were running.

From this descriptive analysis, the *impressions* for both pairs of datasets seems to be fairly similar, with IMP_{off+a} having average *impressions* of 2474.4 whilst IMP_{off-a} has a 1919.4 average, and IMP_{off+b} has average *impressions* of 1790.7 whilst IMP_{off-b} has a 1371.4 average.

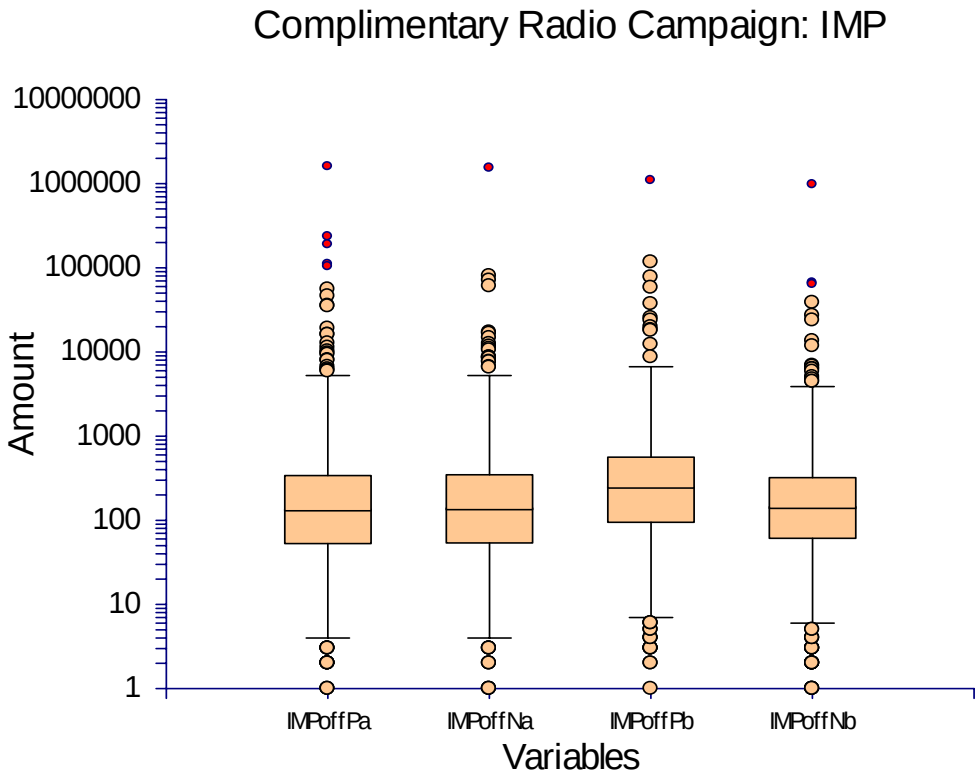


Figure 4: Box Plot comparing impressions for campaigns with and without radio ads

With the sample size big enough ($n_1 = n_2 = 1164 > 30$) to assume that the sampling distribution takes on a normal distribution, and *impression* entries in all four sets for corresponding keywords, a paired T-Test was used to test for a statistically significant difference between the IMP_{off+a} and IMP_{off-a} datasets, with the statistical output of this process shown in appendix A.2. Similarly, a paired T-Test was used to test for a statistically significant difference between the IMP_{off+b} and IMP_{off-b} datasets, with the statistical output of this process shown in appendix A.3.

For *difference* ($IMP_{off+a} – IMP_{off-a}$) < > 0 under the Paired T-Test with $\alpha = 0.05$, the *p-value* is given as 0.02, and the null hypothesis $H2_0$ can be rejected, meaning that **the two sample means (IMP_{off+a} and IMP_{off-a}) can be statistically proven to be significantly**

different at the 10% level. The T-Value of 2.3164 also indicates that the two sample means differ by 2.3 standard errors. The *difference* ($IMP_{off+a} - IMP_{off-a}) > 0$ also has a *p-value* of 0.01, meaning that IMP_{off+a} are significantly more than IMP_{off-a}.

For *Difference* ($IMP_{off+b} - IMP_{off-b}) <> 0$ under the Paired T-Test with α = 0.05, the *p-value* is given as 0.001, and the null hypothesis $H2_0$ can again be rejected, meaning that **the two sample means (IMP_{off+b} and IMP_{off-b}) can be statistically proven to be significantly different at the 10% level**. The T-Value of 3.161 also indicates that the two sample means differ by 3.1 standard errors. The *difference* ($IMP_{off+b} - IMP_{off-b}) > 0$ also has a *p-value* of 0.001, meaning that IMP_{off+b} are significantly more than IMP_{off-b}.

We can therefore conclude that enough statistical evidence exists to suggest that *impressions* for SSA campaigns exhibiting a complimentary offline radio advertisement campaign are significantly more than *impressions* for SSA campaigns without the use of complimentary offline radio advertisements.

5.2.2.2 Impressions: Offline Television Adverts

To further research the second null hypothesis under objective 1, data from an internet-based company making use of SSA whilst supplementing it with intermittent television adverts were also investigated. SSA results data for two distinct periods (one with complimentary offline television advertisements running, and another without complimentary offline television advertisements) were obtained from a prominent internet-based company making use of offline television advertisements at various stages. The dataset for the 4-week period when complimentary offline television advertisements were

running contained 26281 keyword entries, as well as the dataset for the 4-week long period when no complimentary offline television ads were running.

Figure 5 shows a box plot frequency representation of the *impressions* for the keywords in the SSA campaign during which complimentary offline television advertisements were running (IMP_{off+}), and the *impressions* for a similar duration when no complimentary offline television advertisements (IMP_{off-}) were active.

From this descriptive analysis, there seems to be some difference between the two *impression* data sets, with IMP_{off+} having average *impressions* of 208.7 whilst IMP_{off-} has a 254.2 average.

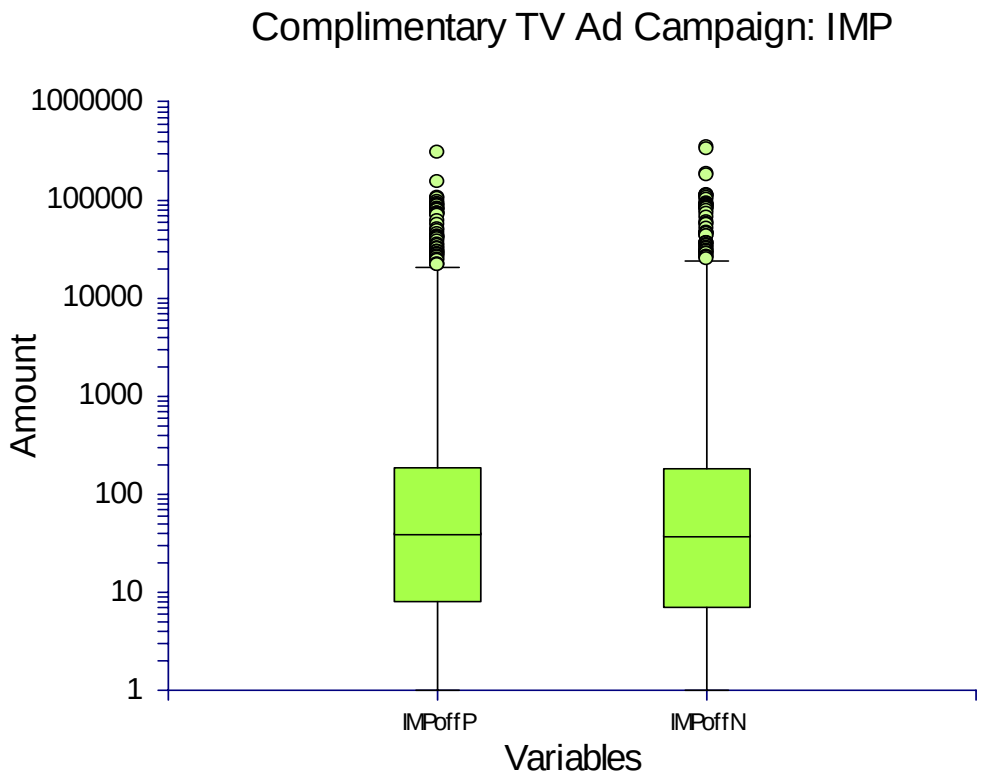


Figure 5: Box Plot comparing impressions for campaigns with and without television ads

With the sample size big enough ($n_1 = n_2 = 26281 > 30$) to assume that the sampling distribution takes on a normal distribution, and *impression* entries in both sets for corresponding keywords, a paired T-Test was used to test for a statistically significant difference between the IMP_{off+} and IMP_{off-} datasets. The statistical output of this process is shown in appendix A.4.

For *difference* ($IMP_{off+} - IMP_{off-}$) $<>$ 0 under the Paired T-Test with $\alpha = 0.05$, the $p\text{-}value$ is given as 0.002, and the null hypothesis $H2_0$ can therefore be rejected, meaning that **the two sample means (IMP_{off+} and IMP_{off-}) can be statistically proven to be significantly different at the 10% level**. However, the *difference* ($IMP_{off+} - IMP_{off-}$) > 0 has a the $p\text{-}value$ of 0.99, whilst the *difference* ($IMP_{off+} - IMP_{off-}$) < 0 has a the $p\text{-}value$ of 0.002, meaning that the opposite of the research objective can be inferred from the results. The T-Value of -3.032 indicates that the two sample means differ by 3 standard errors.

We can therefore conclude that statistical evidence exists to suggest that *impressions* for SSA campaigns during complimentary offline television advertisements are significantly less than *impressions* for SSA campaigns without complimentary offline television advertisements.

5.3 Objective 2: Influence of Complimentary Adverts on Click-Through Rates

The null hypothesis under objective 2 stated that *click-through rates* (CTR) obtained with a complimentary advertisement campaign is equal to *click-through rates* obtained without a complimentary advertisement campaign. The alternative hypothesis stated that the

click-through rates (CTR) obtained with a complimentary advertisement campaign is significantly higher than *click-through rates* obtained without a complimentary advertisement campaign.

5.3.1 Click-Through Rate: Online Display Adverts

SSA results data for two distinct periods (one with complimentary online display advertisements active, and another without complimentary online advertisements) were obtained from a prominent internet-based company making use of only online display advertisements at various stages. The dataset for the week long period when complimentary online advertisements were running, contained 2045 keyword entries, whilst the dataset for the week long period when no complimentary online ads were running, contained 2104 keyword entries. In order to reduce the effect that keywords appearing in one dataset and not the other may have on the results, only keywords appearing in both datasets (and hence used in both periods) were used in the analysis, whilst keywords appearing in only one of the sets were removed (by use of a specially written program), resulting in a final dataset with 946 paired keywords.

Figure 6 shows a box plot frequency representation of the *click-through rates* for the keywords in the SSA campaign during which complimentary online display advertisements were active (CTR_{on+}), and the *click-through rates* for a similar duration when no complimentary online display advertisements (CTR_{on-}) were active.

From this descriptive analysis, the *click-through rates* for both sets seems to be fairly similar, with CTR_{on+} having an average *click-through rate* of 0.12 whilst CTR_{on-} has a 0.13 average.

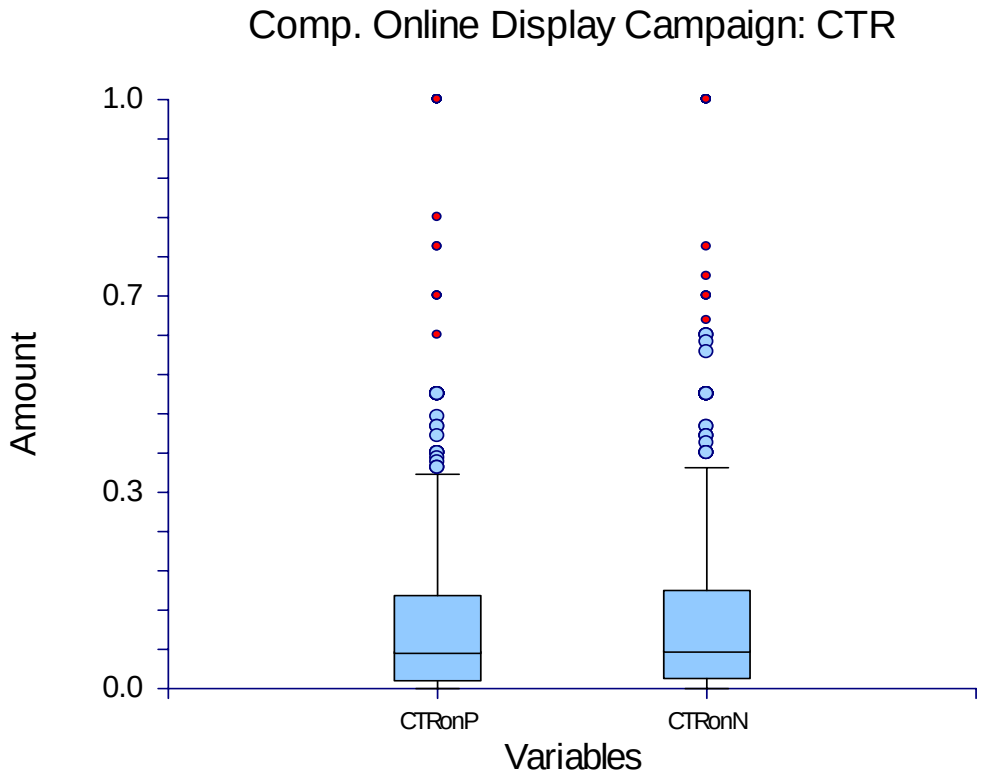


Figure 6: Box Plot comparing CTR's for campaigns with and without online display ads

With the sample size big enough ($n_1 = n_2 = 946 > 30$) to assume that the sampling distribution takes on a normal distribution, and CTR entries in both sets for corresponding keywords, a paired T-Test was used to test for a statistically significant difference between the CTR_{on+} and CTR_{on-} datasets. The statistical output of this process is shown in appendix A.5.

For *difference* ($CTR_{on+} – CTR_{on-}$) $<>$ 0 under the Paired T-Test with $\alpha = 0.05$, the *p-value* is given as 0.18, and the null hypothesis $H3_0$ can not be rejected, meaning that **the two sample means (CTR_{on+} and CTR_{on-}) can not be statistically proven to be significantly different at the 10% level**. The T-Value of -1.3229 also indicates that the two sample means differ only with 1.3 standard errors.

We can therefore conclude that no statistical evidence exists to suggest that *click-through rates* for SSA campaigns with complimentary online display advertisements are different to *click-through rates* for SSA campaigns without complimentary online display advertisements.

5.3.2.1 Click-Through Rate: Offline Radio Adverts

The null hypothesis under objective 2 also stated that *click-through rates* (CTR) obtained with a complimentary offline advertisement campaign (off+) is equal to *click-through rates* obtained without a complimentary offline advertisement campaign (off-). The alternative hypothesis stated that *click-through rates* (CTR) obtained with a complimentary offline advertisement campaign (off+) are significantly more than *click-through rates* obtained without a complimentary offline advertisement campaign (off-).

To fulfil this objective, data from two independent internet-based companies were obtained; one making use of SSA whilst supplementing it with intermittent radio adverts, and the other supplementing its SSA campaign with television adverts. SSA results data for four distinct week-long periods were obtained from the company making use of only offline radio advertisements at various stages. During two of these sample periods the company ran complimentary offline radio advertisements, whilst the samples for the periods when no complimentary offline advertisements ran, were taken two weeks after the initial two periods respectively. The four datasets contained 2500 independent keyword entries for the periods. In order to reduce the effect that keywords appearing in one dataset and not the others may have on the results, only keywords appearing in all

four datasets (and hence used in all four periods) were used in the analysis, whilst keywords appearing in only one of the sets were removed (by use of a specially written program), resulting in a final dataset with 1164 keywords.

Figure 7 shows a box plot frequency representation of the *click-through rates* for the keywords in the SSA campaign during two periods in which complimentary offline radio advertisements were running (CTR_{off+}), and the *click-through rates* for a similar duration when no complimentary offline radio advertisements (CTR_{off-}) were running.

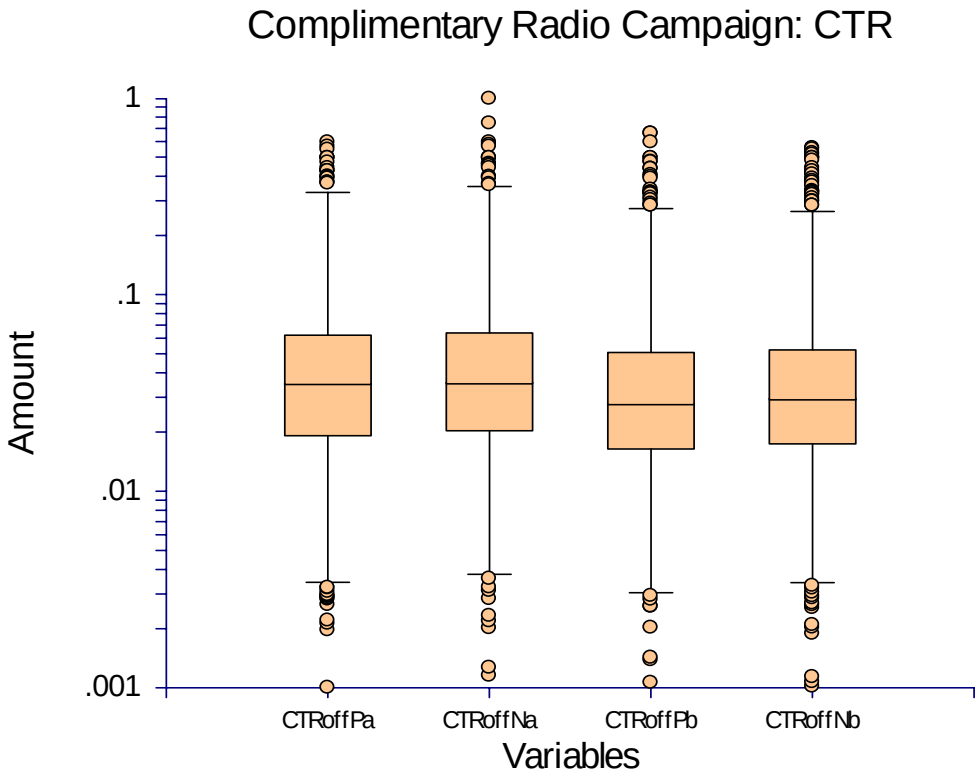


Figure 7: Box Plot comparing CTR's for campaigns with and without offline radio ads

From this descriptive analysis, the *click-through rates* for both pairs of datasets seems to be fairly similar, with CTR_{off+a} having an average *click-through rate* of 0.0535 whilst CTR_{off-a} has a 0.055 average, and CTR_{off+b} with an average *click-through rate* of 0.045 whilst CTR_{off-b} has a 0.046 average.

With the sample size big enough ($n_1 = n_2 = 1164 > 30$) to assume that the sampling distribution takes on a normal distribution, and CTR entries in all four sets for corresponding keywords, a paired T-Test was used to test for a statistically significant difference between the CTR_{off+a} and CTR_{off-a} datasets, with the statistical output of this process shown in appendix A.6. Similarly, a paired T-Test was used to test for a statistically significant difference between the CTR_{off+b} and CTR_{off-b} datasets, with the statistical output of this process shown in appendix A.7.

For *difference* $(CTR_{off+a} - CTR_{off-a}) <> 0$ under the Paired T-Test with $\alpha = 0.05$, the *p-value* is given as 0.38, and the null hypothesis $H4_0$ can not be rejected, meaning that **the two sample means (CTR_{off+a} and CTR_{off-a}) can not be statistically proven to be significantly different at the 10% level**. The T-Value of -0.878 also indicates that the two sample means differ only with 0.9 standard errors.

For *difference* $(CTR_{off+b} - CTR_{off-b}) <> 0$ under the Paired T-Test with $\alpha = 0.05$, the *p-value* is given as 0.35, and the null hypothesis $H4_0$ can once again not be rejected, meaning that **the two sample means (CTR_{off+b} and CTR_{off-b}) can not be statistically proven to be significantly different at the 10% level**. The T-Value of -0.931 also indicates that the two sample means differ only with 0.9 standard errors.

We can therefore conclude that no statistical evidence exists to suggest that *click-through rates* for SSA campaigns with complimentary offline radio advertisements are different to

click-through rates for SSA campaigns without complimentary offline radio advertisements.

5.3.2.2 Click-Through Rate: Offline Television Adverts

SSA results data for two distinct periods (one with complimentary offline television advertisements running, and another without complimentary offline television advertisements) were obtained from a prominent internet-based company making use of offline television advertisements at various stages. The dataset for the 4-week period when complimentary offline television advertisements were running contained 26281 keyword entries, as well as the dataset for the 4-week long period when no complimentary offline television ads were running.

Figure 8 shows a box plot frequency representation of the *click-through rates* for the keywords in the SSA campaign during which complimentary offline television advertisements were running (CTR_{off+}), and the *click-through rates* for a similar duration when no complimentary offline telision advertisements (CTR_{off-}) were active.

From this descriptive analysis, there seems to be some difference between the two *click-through rates*, with CTR_{off+} having an average *click-through rate* of 1.06 whilst CTR_{off-} has a 1.17 average.

With the sample size big enough ($n_1 = n_2 = 26281 > 30$) to assume that the sampling distribution takes on a normal distribution, and CTR entries in both sets for corresponding keywords, a paired T-Test was used to test for a statistically significant difference

between the CTR_{off+} and CTR_{off-} datasets. The statistical output of this process is shown in appendix A.8.

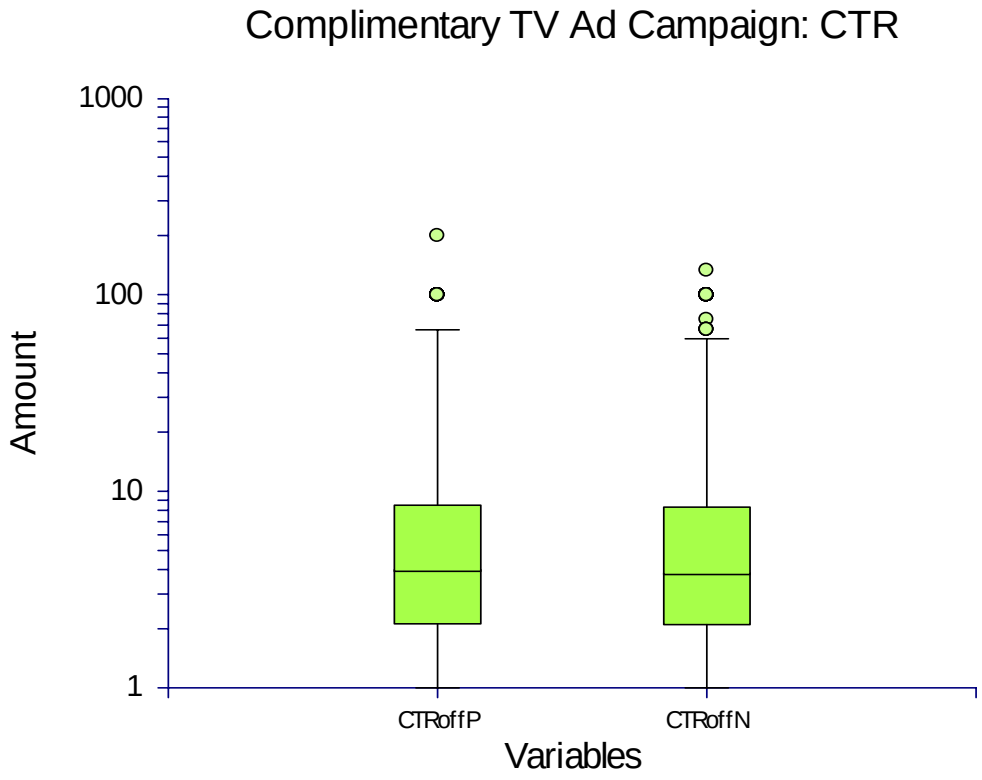


Figure 8: Box Plot comparing CTR's for campaigns with and without offline television ads

For *difference* ($CTR_{off+} - CTR_{off-}$) < > 0 under the Paired T-Test with $\alpha = 0.05$, the *p-value* is given as 0.01, and the null hypothesis $H4_0$ can therefore be rejected, meaning that **the two sample means (CTR_{off+} and CTR_{off-}) can be statistically proven to be significantly different at the 10% level**. However, the *difference* ($CTR_{off+} - CTR_{off-}$) > 0 has a the *p-value* of 0.99, whilst the *difference* ($CTR_{off+} - CTR_{off-}$) < 0 has a the *p-value* of 0.01, meaning that the opposite of the research objective can be inferred from the results. The T-Value of -2.54 indicates that the two sample means differ by 2.5 standard errors.

We can therefore conclude that statistical evidence exists to suggest that *click-through rates* for SSA campaigns during complimentary offline television advertisements are significantly less than *click-through rates* for SSA campaigns without complimentary offline television advertisements.

5.4 Objective 3: Influence of Complimentary Advertisements on Visitor Behaviour

The following section shows the results obtained from investigating the differences measured in the behaviour of visitors gained through SSA campaigns, dependent on various complimentary advertisement campaigns mixed with the SSA campaign, as per the third objective of the research.

5.4.1 Pages Visited: Online Display Adverts

The fifth null hypothesis stated that the *number of pages viewed* by a visitor will remain the same when a complimentary online display advertisement campaign is implemented. The alternative hypothesis stated that the number of *pages viewed* by a visitor will significantly decrease when a complimentary online display advertisement campaign is implemented.

SSA results data for two distinct periods (one with complimentary online display advertisements active, and another without complimentary online advertisements) from a prominent internet-based company making use of only online display advertisements at various stages were again used. The dataset for the two week long periods were again

reduced to only contain corresponding keywords, resulting in a final dataset with 946 paired keywords.

Figure 9 shows a box plot frequency representation of the *pages per visit* for the keywords in the SSA campaign during which complimentary online display advertisements were active (PV_{on+}), and the *pages per visit* for a similar duration when no complimentary online display advertisements (PV_{on-}) were active.

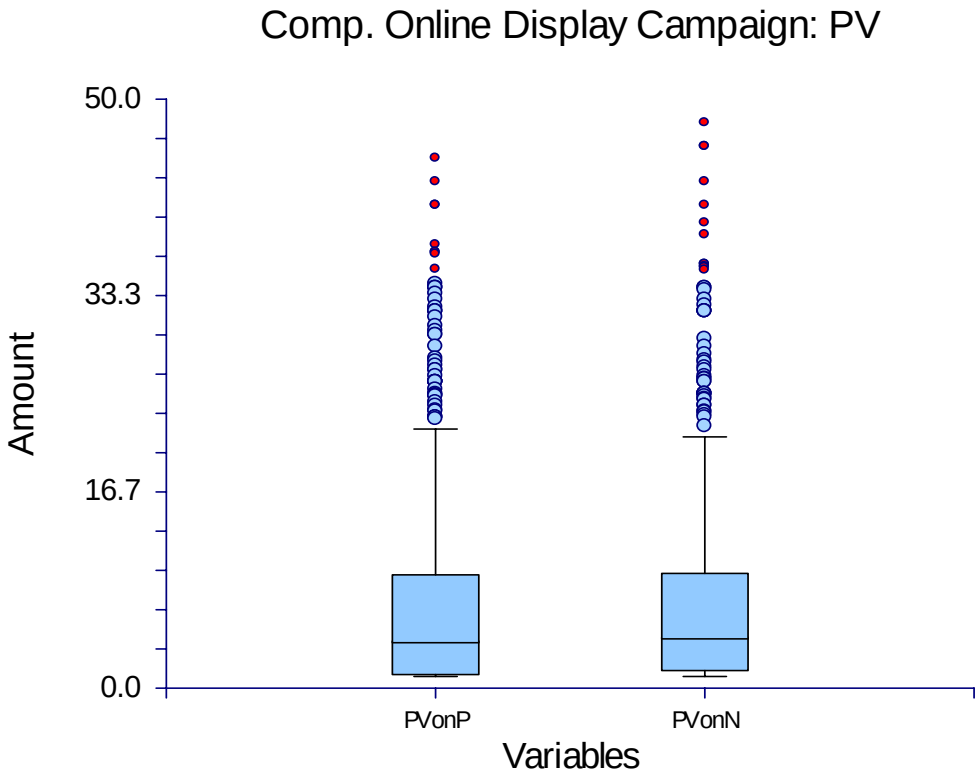


Figure 9: Box Plot comparing PV's for campaigns with and without online display ads

From this descriptive analysis, the *pages per visit* for both sets seems to be fairly similar, with PV_{on+} having an average of 7.55 whilst PV_{on-} has a 7.39 average.

With the sample size big enough ($n_1 = n_2 = 946 > 30$) to assume that the sampling distribution takes on a normal distribution, and PV entries in both sets for corresponding

keywords, a paired T-Test was used to test for a statistically significant difference between the PV_{on+} and PV_{on-} datasets. The statistical output of this process is shown in appendix A.9.

For *difference* ($PV_{on+} - PV_{on-}$) <> 0 under the Paired T-Test with $\alpha = 0.05$, the $p\text{-}value$ is given as 0.684, and the null hypothesis $H5_0$ can not be rejected, meaning that **the two sample means (PV_{on+} and PV_{on-}) can not be statistically proven to be significantly different at the 10% level**. The T-Value of 0.407 also indicates that the two sample means differ only with 0.4 standard errors.

We can therefore conclude that no statistical evidence exists to suggest that *pages per visit* for SSA campaigns with complimentary online display advertisements are different to *pages per visit* for SSA campaigns without complimentary online display advertisements.

5.4.2 Pages Visited: Offline Radio Adverts

The sixth null hypothesis stated that the *number of pages viewed* by a visitor will remain the same when a complimentary offline advertisement campaign is implemented. The alternative hypothesis stated that the *number of pages* viewed by a visitor will significantly decrease when a complimentary offline advertisement campaign is implemented.

SSA results data for four distinct week-long periods from a prominent internet-based company making use of only offline radio advertisements at various stages were again used for this analysis. During two of these sample periods the company ran complimentary offline radio advertisements, whilst the samples for the periods when no

complimentary offline advertisements ran, were taken two weeks after the initial two periods respectively. The four datasets were again merged to contain only corresponding keywords, resulting in a final dataset with 1164 keywords.

Figure 10 shows a box plot frequency representation of the *number of pages per visit* for the keywords in the SSA campaign during two periods in which complimentary offline radio advertisements were running (PV_{off+}), and the *pages per visit* for a similar duration when no complimentary offline radio advertisements (PV_{off-}) were running.

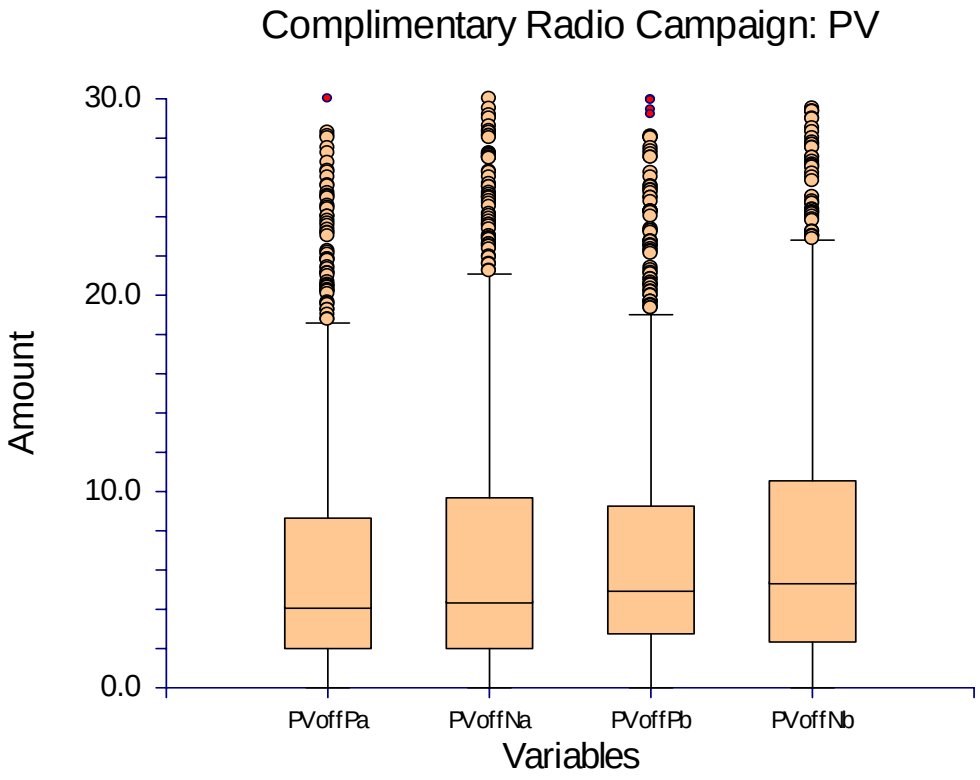


Figure 10: Box Plot comparing PV's for campaigns with and without offline radio ads

From this descriptive analysis, the *pages per visit* for both pairs of datasets seems to be more for periods when no offline radio campaigns were active, with PV_{off+a} having an average of 7.34 whilst PV_{off-a} has a 8.31 average, and PV_{off+b} with an average of 7.57 whilst PV_{off-b} has a 8.96 average.

With the sample size big enough ($n_1 = n_2 = 1164 > 30$) to assume that the sampling distribution takes on a normal distribution, and *pages per visit* entries in all four sets for corresponding keywords, a paired T-Test was used to test for a statistically significant difference between the PV_{off+a} and PV_{off-a} datasets, with the statistical output of this process shown in appendix A.10. Similarly, a paired T-Test was used to test for a statistically significant difference between the PV_{off+b} and PV_{off-b} datasets, with the statistical output of this process shown in appendix A.11.

For *difference* $(PV_{off+a} – PV_{off-a}) <> 0$ under the Paired T-Test with $\alpha = 0.05$, the *p-value* is given as 0.01, and the null hypothesis $H6_0$ can therefore be rejected, meaning that **the two sample means (PV_{off+a} and PV_{off-a}) can be statistically proven to be significantly different at the 10% level**. The *difference* $(PV_{off+a} – PV_{off-a}) > 0$ has a the *p-value* of 0.99, whilst the *difference* $(PV_{off+a} – PV_{off-a}) < 0$ has a the *p-value* of 0.003, meaning that the alternative hypothesis can be inferred from the results. The T-Value of -2.74 indicates that the two sample means differ by 2.7 standard errors.

For *difference* $(PV_{off+b} – PV_{off-b}) <> 0$ under the Paired T-Test with $\alpha = 0.05$, the *p-value* is given as less than 0.001, and the null hypothesis $H6_0$ can therefore again be rejected, meaning that **the two sample means (PV_{off+b} and PV_{off-b}) can be statistically proven to be significantly different at the 10% level**. However, the *difference* $(PV_{off+b} – PV_{off-b}) > 0$ has a *p-value* of more than 0.99, whilst the *difference* $(PV_{off+b} – PV_{off-b}) < 0$ has a the *p-value* of less than 0.001, meaning that the alternative hypothesis can once again

be proven. The T-Value of -4.161 indicates that the two sample means differ by 4.6 standard errors.

We can therefore conclude that sufficient statistical evidence exists to suggest that the number of *pages per visit* for SSA campaigns during complimentary offline radio advertisements are significantly less than the *number of pages per visit* for SSA campaigns without complimentary offline radio advertisements.

5.4.3 Time Spent: Online Display Adverts

The seventh null hypothesis under the third research objective stated that the *time spent* viewing the website will remain the same when a complimentary online display advertisement campaign is implemented. The alternative hypothesis stated that the *time spent* viewing the website will significantly improve when a complimentary online display advertisement campaign is implemented.

The SSA results data of a prominent internet-based company making use of only online display advertisements at various stages were once again used for this analysis, where the dataset were merged to contain only corresponding keywords, resulting in a final dataset with 946 paired keywords.

Figure 11 shows a box plot frequency representation of the *time spent* viewing a website generated from the keywords in the SSA campaign during which complimentary online display advertisements were active (TS_{on+}), and the *time spent* for a similar duration when no complimentary online display advertisements (TS_{on-}) were active.

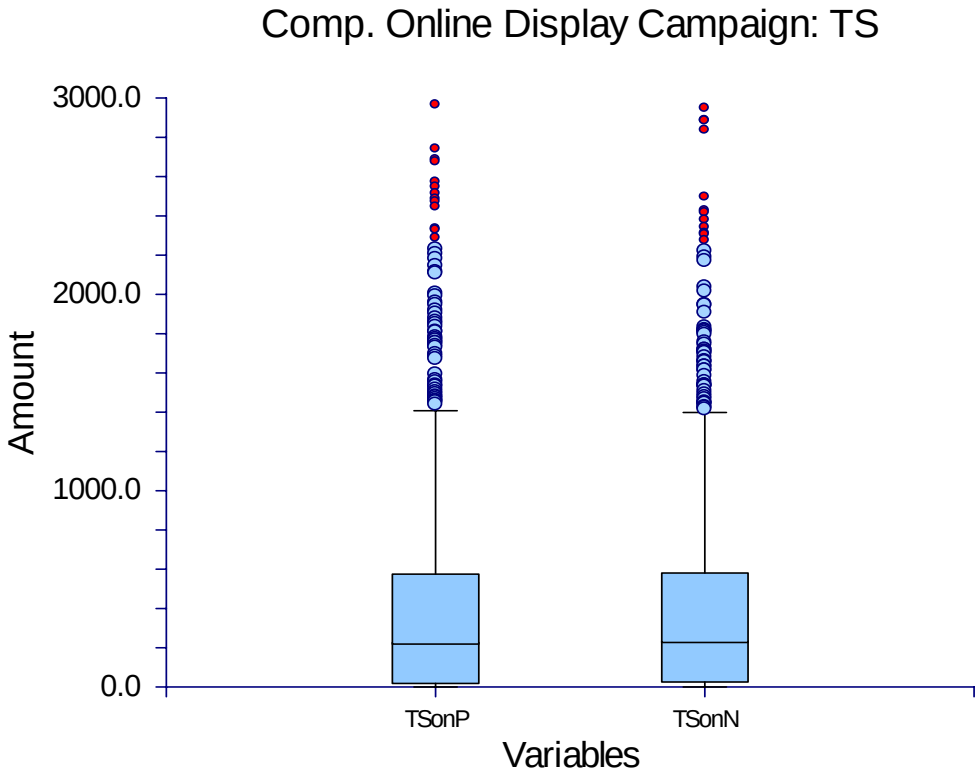


Figure 11: Box Plot comparing time spent for campaigns with and without online display ads

From this descriptive analysis, the *time spent* for both sets seems to be fairly similar, with TS_{on+} having an average of 451.7 seconds whilst TS_{on-} has a 442.5 second average.

With the sample size big enough ($n_1 = n_2 = 946 > 30$) to assume that the sampling distribution takes on a normal distribution, and TS entries in both sets for corresponding keywords, a paired T-Test was used to test for a statistically significant difference between the TS_{on+} and TS_{on-} datasets. The statistical output of this process is shown in appendix A.12.

For *difference* ($TS_{on+} - TS_{on-}$) <> 0 under the Paired T-Test with $\alpha = 0.05$, the *p-value* is given as 0.737, and the null hypothesis $H7_0$ can not be rejected, meaning that **the two sample means (TS_{on+} and TS_{on-}) can not be statistically proven to be significantly**

different at the 10% level. The T-Value of 0.336 also indicates that the two sample means differ only with 0.3 standard errors.

We can therefore conclude that no statistical evidence exists to suggest that *time spent* visiting the website for SSA campaigns with complimentary online display advertisements are different to *time spent* visiting the website for SSA campaigns without complimentary online display advertisements.

5.4.4 Time Spent: Offline Radio Adverts

The eighth null hypothesis stated that the *time spent* viewing the website will remain the same when a complimentary offline advertisement campaign is implemented. The alternative hypothesis stated that the *time spent* viewing the website will significantly improve when a complimentary offline advertisement campaign is implemented.

SSA results data for four distinct week-long periods were obtained from a prominent internet-based company making use of only offline radio advertisements at various stages. During two of these sample periods the company ran complimentary offline radio advertisements, whilst the samples for the periods when no complimentary offline advertisements ran, were taken two weeks after the initial two periods respectively. The four datasets were reduced to contain only corresponding keywords, resulting in a final dataset with 1164 keywords.

Figure 12 shows a box plot frequency representation of the *time spent* for visits to the website generated from the keywords in the SSA campaign during two periods in which

complimentary offline radio advertisements were running (TS_{off+}), and the *time spent* for a similar duration when no complimentary offline radio advertisements (TS_{off-}) were running.

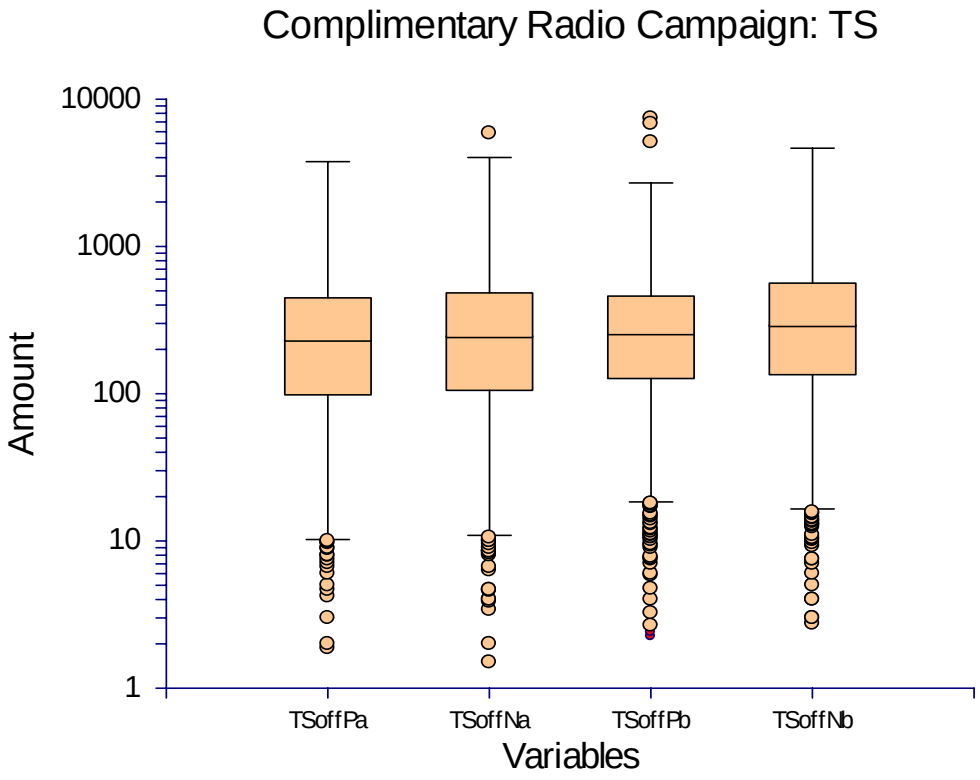


Figure 12: Box Plot comparing time spent for campaigns with and without radio ads

From this descriptive analysis, the *time spent* for both pairs of datasets seems to be more for periods when no offline radio campaigns were active, with TS_{off+a} having an average of 295.58 seconds whilst TS_{off-a} has a 334.1 average, and TS_{off+b} with an average of 337.1 whilst TS_{off-b} has a 372.9 average.

With the sample size big enough ($n_1 = n_2 = 1164 > 30$) to assume that the sampling distribution takes on a normal distribution, and *time spent* entries in all four sets for corresponding keywords, a paired T-Test was used to test for a statistically significant difference between the TS_{off+a} and TS_{off-a} datasets, with the statistical output of this process shown in appendix A.13. Similarly, a paired T-Test was used to test for a

statistically significant difference between the TS_{off+b} and TS_{off-b} datasets, with the statistical output of this process shown in appendix A.14.

For *difference* ($TS_{off+a} - TS_{off-a}$) $<>$ 0 under the Paired T-Test with $\alpha = 0.05$, the *p-value* is given as 0.01, and the null hypothesis $H8_0$ can therefore be rejected, meaning that **the two sample means (TS_{off+a} and TS_{off-a}) can be statistically proven to be significantly different at the 10% level**. However, the *difference* ($TS_{off+a} - TS_{off-a}$) $>$ 0 has a the *p-value* of more than 0.99, whilst the *difference* ($TS_{off+a} - TS_{off-a}$) $<$ 0 has a the *p-value* of 0.005, meaning that the opposite of the research objective can be inferred from the results. The T-Value of -2.59 indicates that the two sample means differ by 2.6 standard errors.

For *difference* ($TS_{off+b} - TS_{off-b}$) $<>$ 0 under the Paired T-Test with $\alpha = 0.05$, the *p-value* is given as less than 0.03, and the null hypothesis $H8_0$ can therefore again be rejected, meaning that **the two sample means (TS_{off+b} and TS_{off-b}) can be statistically proven to be significantly different at the 10% level**. However, the *difference* ($TS_{off+b} - TS_{off-b}$) $>$ 0 has a *p-value* of more than 0.98, whilst the *difference* ($TS_{off+b} - TS_{off-b}$) $<$ 0 has a the *p-value* of less than 0.016, meaning that the opposite of the research objective can be inferred from the results. The T-Value of -2.17 indicates that the two sample means differ by 2.2 standard errors.

We can therefore conclude that sufficient statistical evidence exists to suggest that the *time spent* visiting the website for SSA campaigns during complimentary offline radio

advertisements are significantly less than the *time spent* for SSA campaigns without complimentary offline radio advertisements.

5.4.5 Bounce Rate: Online Display Adverts

The ninth null hypothesis stated that the *bounce rate* of visitors will remain the same when a complimentary online display advertisement campaign is implemented. The alternative hypothesis stated that the *bounce rate* of visitors will significantly decrease when a complimentary online display advertisement campaign is implemented.

SSA results data for two distinct periods (one with complimentary online display advertisements active, and another without complimentary online advertisements) from a prominent internet-based company making use of only online display advertisements at various stages were again used. The dataset for the two week long periods were again reduced to only contain corresponding keywords, resulting in a final dataset with 946 paired keywords.

Figure 15 shows a box plot frequency representation of the *bounce rate* for the keywords in the SSA campaign during which complimentary online display advertisements were active (BR_{on+}), and the *bounce rate* for a similar duration when no complimentary online display advertisements (BR_{on-}) were active.

From this descriptive analysis, the *bounce rate* for both sets seems to be very similar, with BR_{on+} having an average of 0.404 whilst BR_{on-} has a 0.406 average.

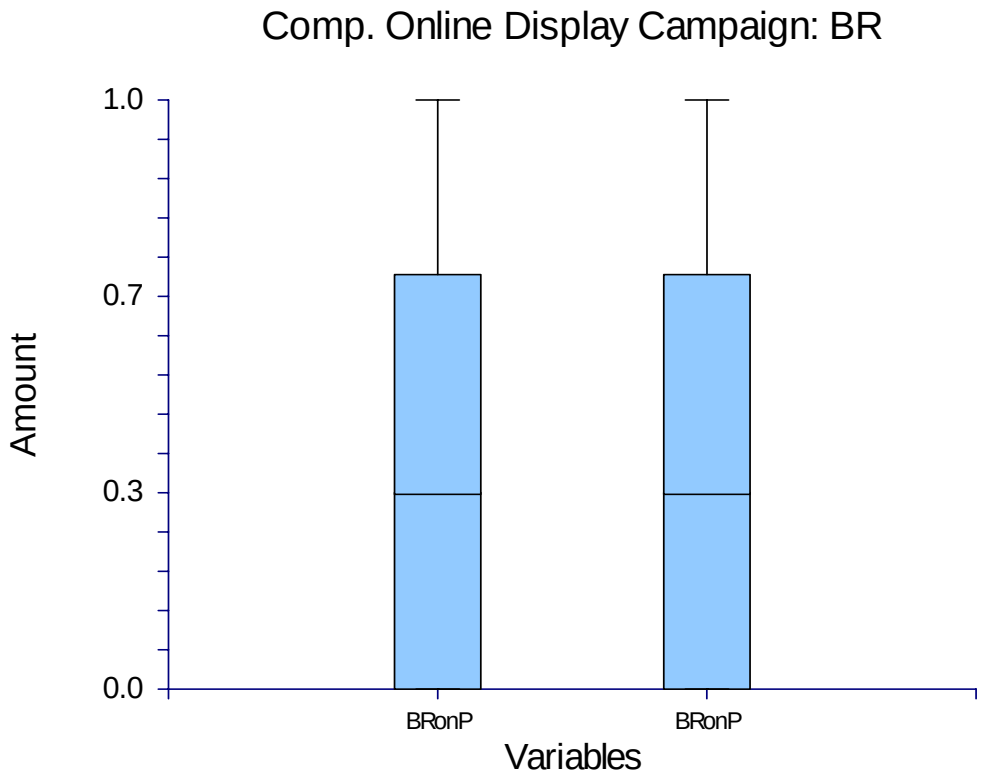


Figure 13: Box Plot comparing BR's for campaigns with and without online display ads

With the sample size big enough ($n_1 = n_2 = 946 > 30$) to assume that the sampling distribution takes on a normal distribution, and BR entries in both sets for corresponding keywords, a paired T-Test was used to test for a statistically significant difference between the BR_{on+} and BR_{on-} datasets. The statistical output of this process is shown in appendix A.15.

For *difference* ($BR_{on+} – BR_{on-}$) <> 0 under the Paired T-Test with $\alpha = 0.05$, the *p-value* is given as 0.896, and the null hypothesis $H9_0$ can not be rejected, meaning that **the two sample means (BR_{on+} and BR_{on-}) can not be statistically proven to be significantly different at the 10% level**. The T-Value of -0.1309 also indicates that the two sample means differ only with 0.1 standard errors.

We can therefore conclude that no statistical evidence exists to suggest that the *bounce rate* for SSA campaigns with complimentary online display advertisements is different to the *bounce rate* for SSA campaigns without complimentary online display advertisements.

5.4.6 Bounce Rate: Offline Display Adverts

The tenth null hypothesis stated that the *bounce rate* will remain the same when a complimentary offline advertisement campaign is implemented. The alternative hypothesis stated that the *bounce rate* will significantly decrease when a complimentary offline advertisement campaign is implemented.

SSA results data for four distinct week-long periods from a prominent internet-based company making use of only offline radio advertisements at various stages were again used for this analysis. During two of these sample periods the company ran complimentary offline radio advertisements, whilst the samples for the periods when no complimentary offline advertisements ran, were taken two weeks after the initial two periods respectively. The four datasets were again merged to contain only corresponding keywords, resulting in a final dataset with 1164 keywords.

Figure 16 shows a box plot frequency representation of the *bounce rate* for the keywords in the SSA campaign during two periods in which complimentary offline radio advertisements were running (BR_{off+}), and the *bounce rate* for a similar duration when no complimentary offline radio advertisements (BR_{off-}) were running.

From this descriptive analysis, the *bounce rate* for both pairs of datasets seems to be more for periods when no offline radio campaigns were active, with BR_{off+a} having an

average of 0.387 whilst BR_{off-a} has a 0.382 average, and BR_{off+b} with an average of 0.385 whilst BR_{off-b} has a 0.360 average.

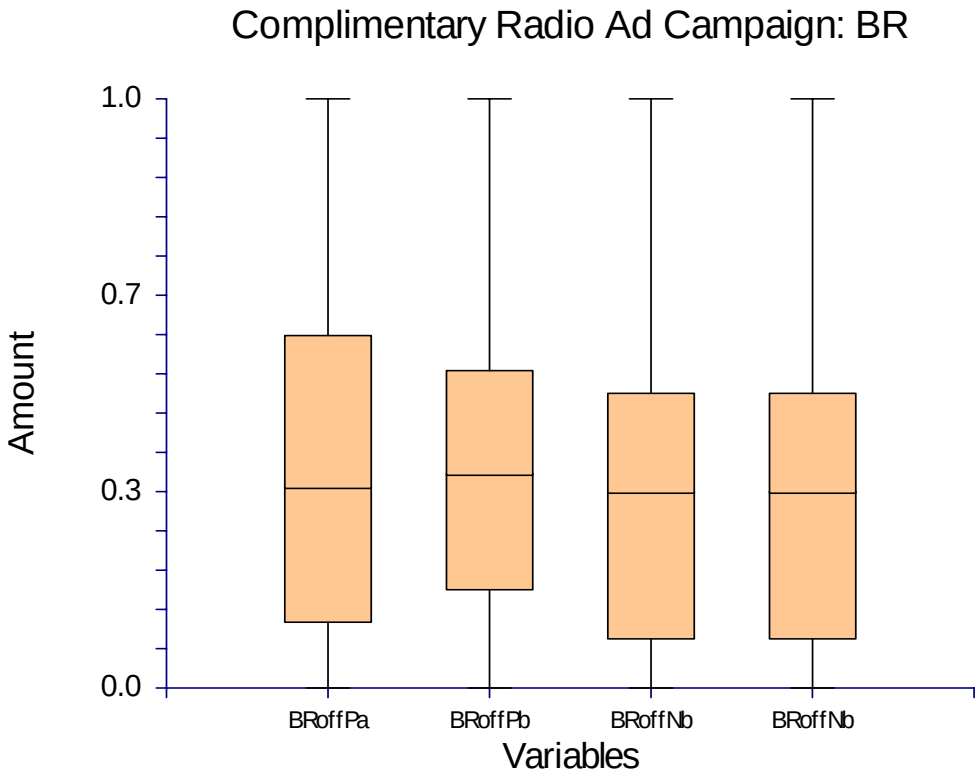


Figure 14: Box Plot comparing BR's for campaigns with and without offline radio ads

With the sample size big enough ($n_1 = n_2 = 1164 > 30$) to assume that the sampling distribution takes on a normal distribution, and *bounce rate* entries in all four sets for corresponding keywords, a paired T-Test was used to test for a statistically significant difference between the BR_{off+a} and BR_{off-a} datasets, with the statistical output of this process shown in appendix A.16. Similarly, a paired T-Test was used to test for a statistically significant difference between the BR_{off+b} and BR_{off-b} datasets, with the statistical output of this process shown in appendix A.17.

For *difference* ($BR_{off+a} - BR_{off-a}$) <> 0 under the Paired T-Test with $\alpha = 0.05$, the *p-value* is given as 0.628, and the null hypothesis $H10_0$ can therefore not be rejected, meaning that **the two sample means (BR_{off+a} and BR_{off-a}) can not be statistically proven to be significantly different at the 10% level**. The T-Value of 0.485 indicates that the two sample means only differ by 0.5 standard errors.

For *difference* ($BR_{off+b} - BR_{off-b}$) <> 0 under the Paired T-Test with $\alpha = 0.05$, the *p-value* is given as less than 0.02, and the null hypothesis $H10_0$ can be rejected here, meaning that **the two sample means (BR_{off+b} and BR_{off-b}) can be statistically proven to be significantly different at the 10% level**. However, the *difference* ($BR_{off+b} - BR_{off-b}$) < 0 has a *p-value* of more than 0.98, whilst the *difference* ($BR_{off+b} - BR_{off-b}$) > 0 has a the *p-value* of 0.011, meaning that the alternative hypothesis can not be proven. The T-Value of 2.2791 indicates that the two sample means differ by 2.3 standard errors.

We can therefore conclude that some statistical evidence exists to suggest that the *bounce rate* for SSA campaigns during complimentary offline radio advertisements are significantly more than the *bounce rate* for SSA campaigns without complimentary offline radio advertisements.

5.5 Objective 4: Influence of Complimentary Advertisements on Cost

The eleventh null hypothesis stated that the *cost-per-click* for an SSA campaign will remain the same when a complimentary advertisement campaign is implemented. The alternative hypothesis stated that the *cost-per-click* will significantly decrease when a complimentary advertisement campaign is implemented. The following section shows the

results obtained from investigating the differences measured in the *cost-per-click* obtained from different SSA campaigns, dependent on various complimentary advertisement campaigns mixed with the SSA campaign, as per the fourth objective of the research.

5.5.1 Cost per Click: Online Display Adverts

SSA results data from a prominent internet-based company making use of only online display advertisements at various stages were once again used for this analysis. The two distinct datasets were reduced to contain only corresponding keywords, resulting in a final merged dataset with 946 paired keywords.

Figure 15 shows a box plot frequency representation of the *cost-per-click* for the keywords in an SSA campaign during which complimentary online display advertisements were active (CPC_{on+}), and the *cost-per-click* for a similar duration when no complimentary online display advertisements (CPC_{on-}) were active.

From this descriptive analysis, the *cost-per-click* for both sets seems to be fairly similar, with CPC_{on+} having an average *cost-per-click* of 0.448 whilst CPC_{on-} has a 0.447 average.

With the sample size big enough ($n_1 = n_2 = 946 > 30$) to assume that the sampling distribution takes on a normal distribution, and CPC entries in both sets for corresponding keywords, a paired T-Test was used to test for a statistically significant difference between the CPC_{on+} and CPC_{on-} datasets. The statistical output of this process is shown in appendix A.18.

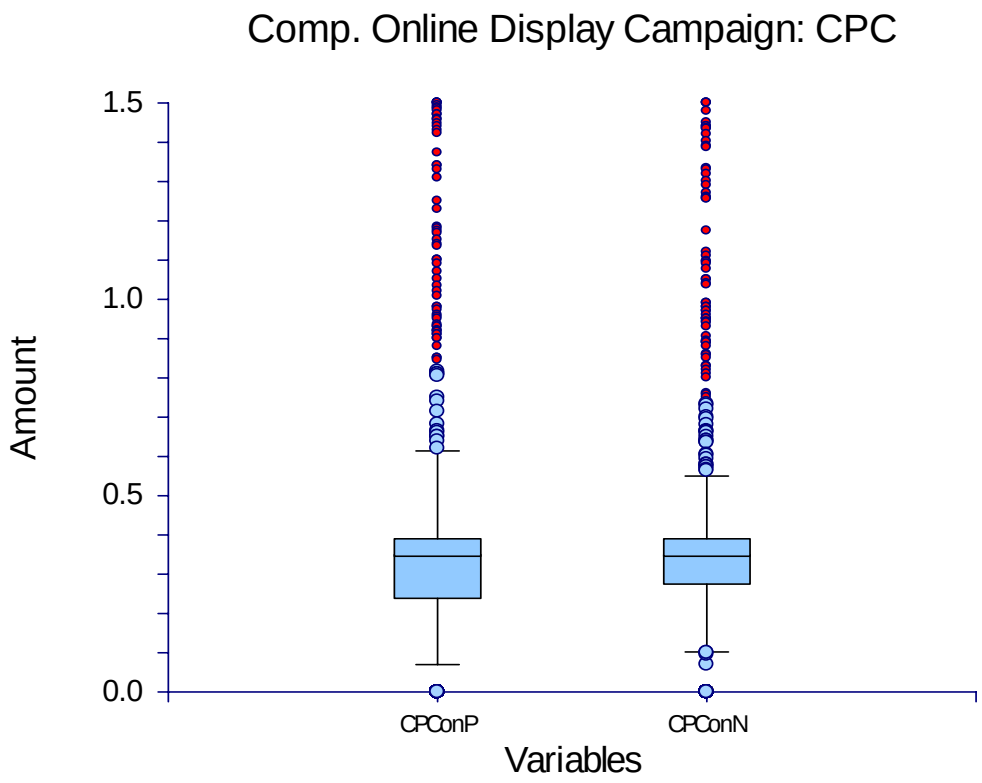


Figure 15: Box Plot comparing CPC for campaigns with and without online display ads

For *difference* ($CPC_{on+} - CPC_{on-}$) $<>$ 0 under the Paired T-Test with $\alpha = 0.05$, the *p-value* is given as 0.966, and the null hypothesis $H11_0$ can not be rejected, meaning that **the two sample means (CPC_{on+} and CPC_{on-}) can not be statistically proven to be significantly different at the 10% level**. The T-Value of 0.042 also indicates that the two sample means differ only with 0.04 standard errors.

We can therefore conclude that no statistical evidence exists to suggest that *cost-per-click* for SSA campaigns with complimentary online display advertisements are different to *cost-per-click* for SSA campaigns without complimentary online display advertisements.

5.5.2.1 Cost per Click: Offline Radio Adverts

The twelfth null hypothesis under objective 4 also stated that *cost-per-click* (CPC) obtained with a complimentary offline advertisement campaign (off+) is equal to *cost-per-click* obtained without a complimentary offline advertisement campaign (off-). The alternative hypothesis stated that *cost-per-click* (CPC) obtained with a complimentary offline advertisement campaign (off+) are significantly less than *cost-per-click* obtained without a complimentary offline advertisement campaign (off-).

SSA results data for four distinct week-long periods were obtained from a prominent internet-based company making use of only offline radio advertisements at various stages. The dataset were reduced to only contain common keywords appearing in all the sets, resulting in a final dataset with 1164 keywords.

Figure 16 shows a box plot frequency representation of the *cost-per-click* for the keywords in the SSA campaign during two periods in which complimentary offline radio advertisements were running (CPC_{off+}), and the *cost-per-click* for a similar duration when no complimentary offline radio advertisements (CPC_{off-}) were running.

From this descriptive analysis, the *cost-per-click* for both pairs of datasets seems to be slightly more for periods when complimentary radio advertisement were active, with CPC_{off+a} having an average *cost-per-click* of 1.155 whilst CPC_{off-a} has a 1.146 average, and CPC_{off+b} with an average *cost-per-click* of 1.203 whilst CPC_{off-b} has a 1.108 average.

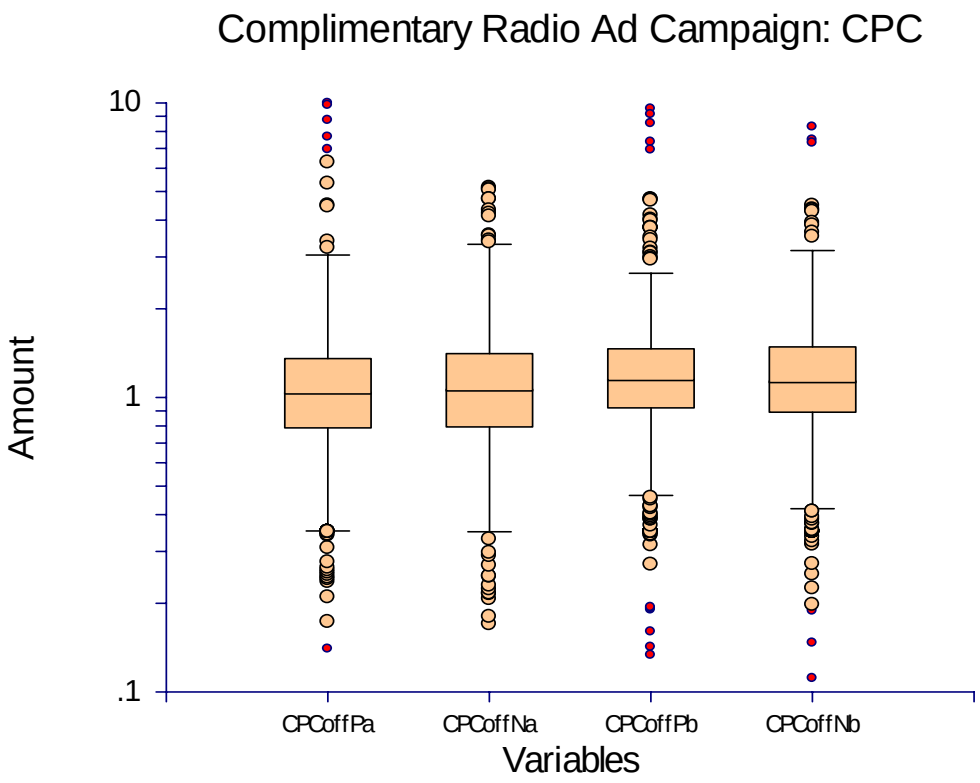


Figure 16: Box Plot comparing CPC's for campaigns with and without offline radio ads

With the sample size big enough ($n_1 = n_2 = 1164 > 30$) to assume that the sampling distribution takes on a normal distribution, and CPC entries in all four sets for corresponding keywords, a paired T-Test was used to test for a statistically significant difference between the CPC_{off+a} and CPC_{off-a} datasets, with the statistical output of this process shown in appendix A.19. Similarly, a paired T-Test was used to test for a statistically significant difference between the CPC_{off+b} and CPC_{off-b} datasets, with the statistical output of this process shown in appendix A.20.

For *difference* ($CPC_{off+a} - CPC_{off-a}$) <> 0 under the Paired T-Test with $\alpha = 0.05$, the *p-value* is given as 0.863, and the null hypothesis $H12_0$ can not be rejected, meaning that **the two sample means (CPC_{off+a} and CPC_{off-a}) can not be statistically proven to be**

significantly different at the 10% level. The T-Value of 0.1729 also indicates that the two sample means differ only with 0.2 standard errors.

For *difference* ($CPC_{off+b} - CPC_{off-b}$) <> 0 under the Paired T-Test with $\alpha = 0.05$, the *p-value* is given as 0.0001, and the null hypothesis $H12_0$ can be rejected, meaning that **the two sample means (CPC_{off+b} and CPC_{off-b}) can indeed be statistically proven to be significantly different at the 10% level**. For *difference* ($CPC_{off+b} - CPC_{off-b}$) > 0 under the Paired T-Test with $\alpha = 0.05$, the *p-value* is also less than 0.0001, meaning that CPC_{off+b} entries are significantly more than CPC_{off-b} entries. The T-Value of 4.712 also indicates that the two sample means differ with 4.7 standard errors.

We can therefore conclude that the one comparison set exhibited no statistical evidence to suggest that *cost-per-click* for SSA campaigns with complimentary offline radio advertisements are significantly different to *cost-per-click* for SSA campaigns without complimentary offline radio advertisements. The second comparison set however showed that *cost-per-click* for SSA campaigns with complimentary offline radio advertisements are significantly higher than *cost-per-click* for SSA campaigns without complimentary offline radio advertisements active.

5.5.2.2 Cost per Click: Offline Television Adverts

SSA results data for two distinct periods (one with complimentary offline television advertisements running, and another without complimentary offline television advertisements) were obtained from a prominent internet-based company making use of offline television advertisements at various stages. The dataset for the 4-week period

when complimentary offline television advertisements were running contained 26281 keyword entries, as well as the dataset for the 4-week long period when no complimentary offline television ads were running.

Figure 17 shows a box plot frequency representation of the *cost-per-click* for the keywords in the SSA campaign during which complimentary offline television advertisements were running (CPC_{off+}), and the *cost-per-click* for a similar duration when no complimentary offline telision advertisements (CPC_{off-}) were active.

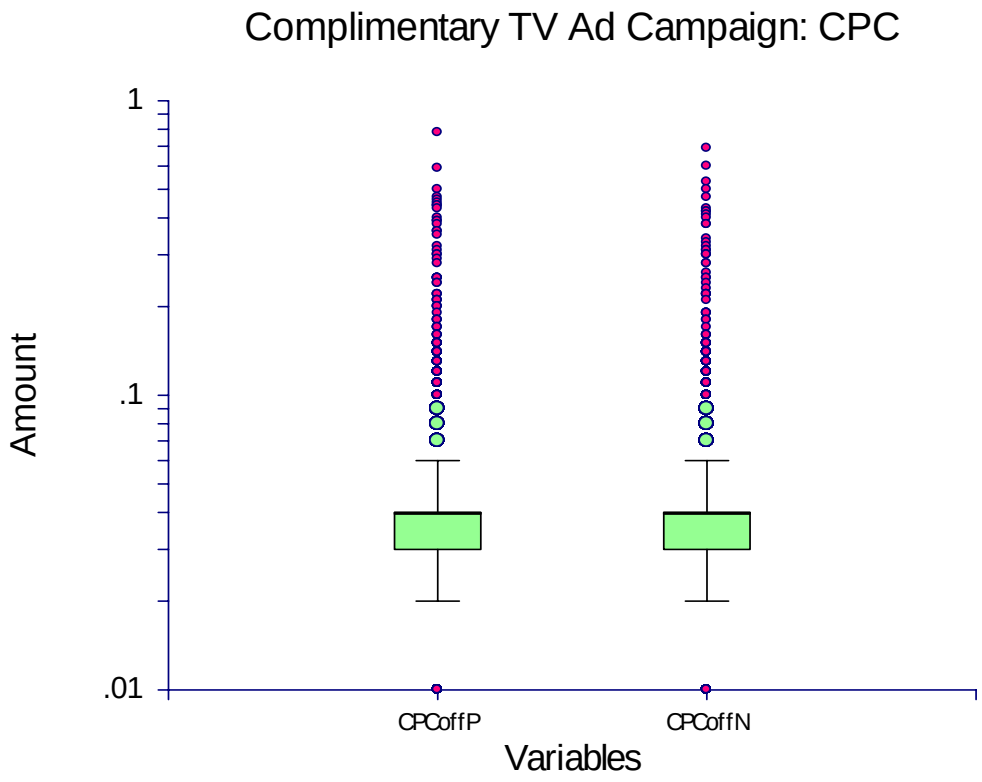


Figure 17: Box Plot comparing CPC's for campaigns with and without offline television ads

From this descriptive analysis, there seems to be some difference between the two *cost-per-click* data sets, with CPC_{off+} having an average *cost-per-click* of 0.007387 whilst CPC_{off-} has a 0.0764 average.

With the sample size big enough ($n_1 = n_2 = 26281 > 30$) to assume that the sampling distribution takes on a normal distribution, and CPC entries in both sets for corresponding keywords, a paired T-Test was used to test for a statistically significant difference between the CPC_{off+} and CPC_{off-} datasets. The statistical output of this process is shown in appendix A.21.

For *difference* ($CPC_{off+} – CPC_{off-}$) $<>$ 0 under the Paired T-Test with $\alpha = 0.05$, the *p-value* is given as 0.005, and the null hypothesis $H12_0$ can therefore be rejected, meaning that **the two sample means (CPC_{off+} and CPC_{off-}) can be statistically proven to be significantly different at the 10% level**. However, the *difference* ($CPC_{off+} – CPC_{off-}$) > 0 has a the *p-value* of more than 0.99, whilst the *difference* ($CPC_{off+} – CPC_{off-}$) < 0 has a the *p-value* of less than 0.01, meaning that CPC_{off+} is indeed less than CPC_{off-}. The T-Value of -2.798 indicates that the two sample means differ by 2.8 standard errors.

We can therefore conclude that statistical evidence exists to suggest that *cost-per-click* for SSA campaigns during complimentary offline television advertisements are significantly less than *cost-per-click* for SSA campaigns without complimentary offline television advertisements.

5.6 Objective 5: Influence of Complimentary Advertisements on Sales

The thirteenth null hypothesis under the last objective stated that *sales* will remain the same when a complimentary advertisement campaign is implemented. The alternative hypothesis stated that *sales* will significantly improve when a complimentary

advertisement campaign is implemented. The following section shows the results obtained from investigating the differences measured in *new registrations* per keyword obtained from different SSA campaigns, dependent on various complimentary advertisement campaigns mixed with the SSA campaign, as per the fifth objective of the research.

5.6.1 New Registrations: Online Display Adverts

SSA results data for two distinct periods (one with complimentary online display advertisements active, and another without complimentary online advertisements) from a prominent internet-based company making use of only online display advertisements at various stages were obtained for this analysis. A reduced dataset containing only 946 paired keywords were used.

Figure 18 shows a box plot frequency representation of the *new registrations* obtained from a keyword search in the SSA campaign during which complimentary online display advertisements were active (NR_{on+}), and *new registrations* for a similar duration when no complimentary online display advertisements (NR_{on-}) were active.

From this descriptive analysis, *new registrations* per keyword search for campaigns with complimentary online display adverts seems to be more than those obtained when no online display adverts were active, with NR_{on+} having average *new registrations* of 0.0001989 whilst NR_{on-} has a mere 0.000004703 average.

With the sample size big enough ($n_1 = n_2 = 946 > 30$) to assume that the sampling distribution takes on a normal distribution, and NR entries in both sets for corresponding

keywords, a paired T-Test was used to test for a statistically significant difference between the NR_{on+} and NR_{on-} datasets. The statistical output of this process is shown in appendix A.22.

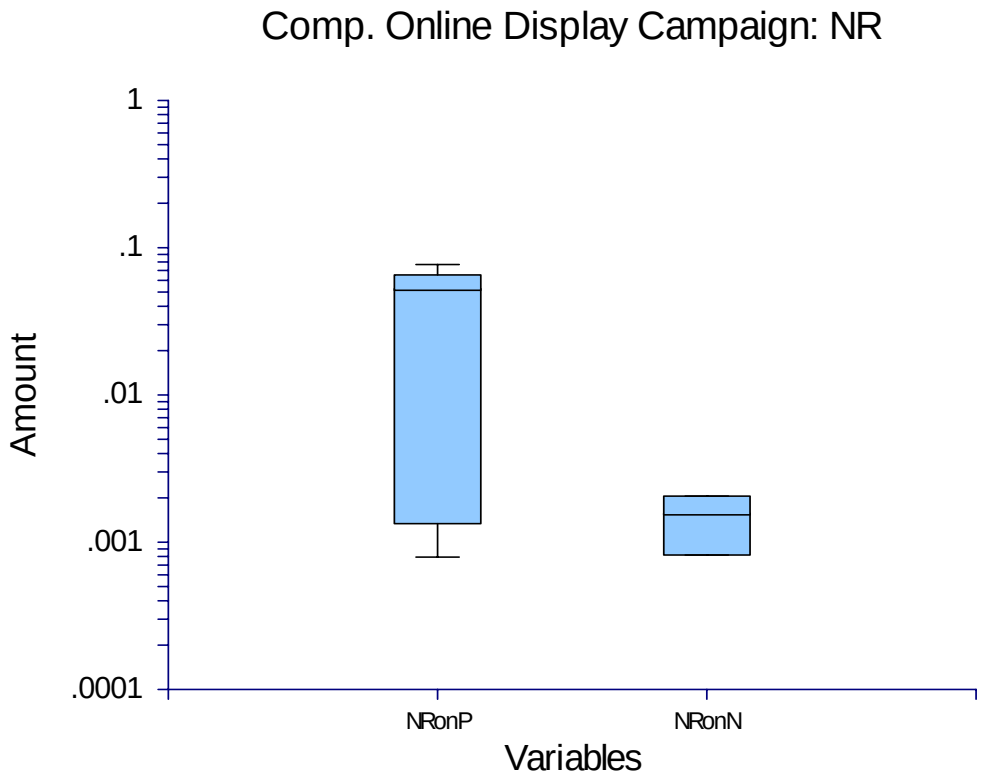


Figure 18: Box Plot comparing NR's for campaigns with and without online display ads

For *difference* ($NR_{on+} - NR_{on-}$) <> 0 under the Paired T-Test with $\alpha = 0.05$, the *p-value* is given as 0.09, and the null hypothesis $H13_0$ can just not be rejected. However, the *difference* ($NR_{on+} - NR_{on-}$) > 0 has a *p-value* of 0.045, meaning that **the sample mean of NR_{on+} can be statistically proven to be more than the sample mean of NR_{on-} at the 10% level**. The T-Value of 1.694 also indicates that the two sample means differ by 1.7 standard errors.

We can therefore conclude that enough statistical evidence exists to suggest that *new registrations* for SSA campaigns with complimentary online display advertisements are slightly more than *new registrations* for SSA campaigns without complimentary online display advertisements.

5.6.2 New Registrations: Offline Radio Adverts

The null hypothesis under objective 5 also stated that *new registrations* (NR) obtained with a complimentary offline advertisement campaign (off+) is equal to *new registrations* obtained without a complimentary offline advertisement campaign (off-). The alternative hypothesis stated that *new registrations* (NR) obtained with a complimentary offline advertisement campaign (off+) are significantly more than *new registrations* obtained without a complimentary offline advertisement campaign (off-).

SSA results data for four distinct week-long periods were obtained from a prominent internet-based company making use of only offline radio advertisements at various stages. The dataset were reduced to only contain common keywords appearing in all the sets, resulting in a final merged dataset with 1164 keywords.

Figure 19 shows a box plot frequency representation of *new registrations* for the keywords in the SSA campaign during two periods in which complimentary offline radio advertisements were running (NR_{off+}), and *new registrations* for a similar duration when no complimentary offline radio advertisements (NR_{off-}) were running.

From this descriptive analysis, *new registrations* for both pairs of datasets seems to be less for periods when complimentary offline advertisements were active, with NR_{off+a}

having average *new registrations* of 0.008277 whilst NR_{off-a} has a 0.01147 average, and NR_{off+b} with average *new registrations* of 0.007563 whilst NR_{off-b} has a 0.01032 average.

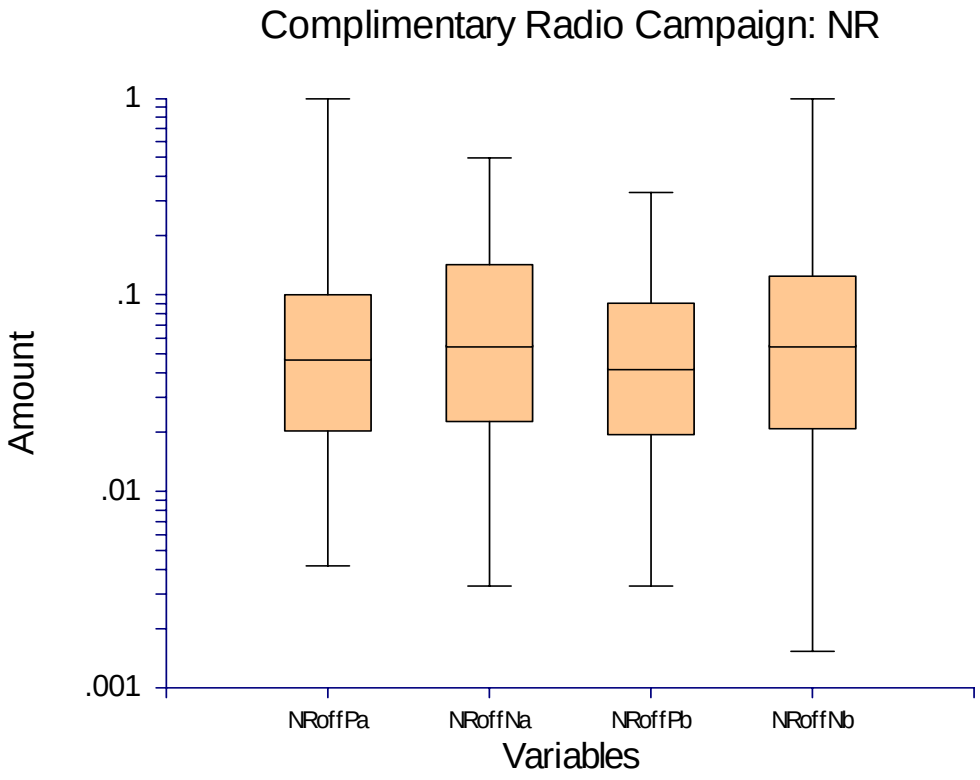


Figure 19: Box Plot comparing NR's for campaigns with and without offline radio ads

With the sample size big enough ($n_1 = n_2 = 1164 > 30$) to assume that the sampling distribution takes on a normal distribution, and NR entries in all four sets for corresponding keywords, a paired T-Test was used to test for a statistically significant difference between the NR_{off+a} and NR_{off-a} datasets, with the statistical output of this process shown in appendix A.23. Similarly, a paired T-Test was used to test for a statistically significant difference between the NR_{off+b} and NR_{off-b} datasets, with the statistical output of this process shown in appendix A.24.

For *difference* ($NR_{off+a} - NR_{off-a}$) <> 0 under the Paired T-Test with $\alpha = 0.05$, the *p-value* is given as 0.113, and the null hypothesis $H14_0$ can just not be rejected, meaning that **the two sample means (NR_{off+a} and NR_{off-a}) can not be statistically proven to be significantly different at the 10% level**. The T-Value of -1.586 also indicates that the two sample means differ only with 1.6 standard errors.

For *difference* ($NR_{off+b} - NR_{off-b}$) <> 0 under the Paired T-Test with $\alpha = 0.05$, the *p-value* is given as 0.171, and the null hypothesis $H14_0$ can once again not be rejected, meaning that **the two sample means (NR_{off+b} and NR_{off-b}) can not be statistically proven to be significantly different at the 10% level**. The T-Value of -1.368 also indicates that the two sample means differ only with 1.4 standard errors.

We can therefore conclude that no statistical evidence exists to suggest that *new registrations* for SSA campaigns with complimentary offline radio advertisements are different to *new registrations* for SSA campaigns without complimentary offline radio advertisements.

5.7 Conclusion

To recap the results obtained from the data analysed in this section, Table 2 provides a summary of all the statistical findings related to each of the research objectives with regards to the presence and absence of online and offline complimentary advertisement campaigns.

Table 2: Summary of results obtained from data analyses

		Online	Offline		
Objective	**Data**	**Display Ads**	**Radio Ads (a)**	**Radio Ads (b)**	**Television Ads**
1	*Impressions*	$IMP_{on+} < > IMP_{on-}$	$IMP_{off+a} > IMP_{off-a}$	$IMP_{off+b} > IMP_{off-b}$	$IMP_{off+} < IMP_{off-}$
2	*Click-Through Rate*	$CTR_{on+} < > CTR_{on-}$	$CTR_{off+a} < > CTR_{off-a}$	$CTR_{off+b} < > CTR_{off-b}$	$CTR_{off+} < CTR_{off-}$
3	*Pages Visited*	$PV_{on+} < > PV_{on-}$	$PV_{off+a} < PV_{off-a}$	$PV_{off+b} < PV_{off-b}$	*no data*
	Time Spent	$TS_{on+} < > TS_{on-}$	$TS_{off+a} < TS_{off-a}$	$TS_{off+b} < TS_{off-b}$	*no data*
	Bounce Rate	$BR_{on+} < > BR_{on-}$	$BR_{off+a} < > BR_{off-a}$	$BR_{off+b} > BR_{off-b}$	*no data*
4	*Cost-per-Click*	$CPC_{on+} < > CPC_{on-}$	$CPC_{off+a} < > CPC_{off-a}$	$CPC_{off+b} > CPC_{off-b}$	$CPC_{off+} < CPC_{off-}$
5	*New Registrations*	$NR_{on+} > NR_{on-}$	$NR_{off+a} < > NR_{off-a}$	$NR_{off+b} < > NR_{off-b}$	*no data*

6 DISCUSSION OF RESULTS

6.1 Introduction

This chapter will discuss in detail the results obtained in chapter 5, providing some possible explanations for the trends observed. Supporting literature for some of the findings will be given, whilst some of the other findings will be shown to be in contradiction with current literature.

6.2 Objective 1: Influence of Complimentary Adverts on Impressions

From the data analysed in Chapter 5, no statistical evidence were found to suggest that supplementary online display advertisements will improve *impressions* of an SSA campaign. This result seems counter intuitive, since one would expect that marketing efforts through an online channel (like display adverts) will generate more awareness about a certain theme, and hence prompt users to search more for topics covered in the SSA campaign keyword list resulting in higher impressions. This result once again begs to question the effectiveness of online display adverts, especially since banner ads seems to be more successful for novice internet users (Dahlen, 2001) where it tends to only annoy expert internet users (Taylor *et al.,* 2008). This also agrees with Havlena *et al.'s* (2004) finding that brand awareness generated in online consumers decay much faster than those generated in offline consumers. Still the effectiveness of content-relevant display ads are deemed to be higher in terms of brand name recall (Yaveroglu *et al.,* 2008). This finding do not support that of Fulgoni *et al*. (2009), who concluded that

display advertising can increase the probability of a consumer to conduct an online search using the branded terms of the advertisers by 38%.

The analysis did however find a positive correlation between complimentary offline radio advertisements and higher *impressions* gained for a simultaneously active SSA campaign. Since offline radio adverts should increase the awareness on a targeted searchable topic, but not necessarily link that topic directly to the advertising company, it can be expected that the greater awareness can lead to increased search queries on the topic (Sen, 2005), and hence increased SSA impressions gained from keywords on that topic. This agrees with the findings of McMains *et al. (*2009) that offline campaigns create brand awareness, whilst online campaigns attract and convert potential customers.

However, a negative correlation was also found between complimentary offline television advertisement and *impressions* for a simultaneously active SSA campaign. This difference in correlation between offline radio and television advertisements may be ascribed to improved brand recognition gained from television adverts (Yaveroglu *et al.,* 2008), negating the need to first make use of a search engine to find data on a particular advertised topic, and prompting the users to go directly to the advertisers website, resulting in fewer *impressions* for a particular SSA campaign when run in conjunction with a television advert.

6.3 Objective 2: Influence of Complimentary Adverts on Click-Through Rates

The research analysis found no statistical evidence to suggest a positive correlation between complimentary online display advertisements and *click-through rates* obtained

from a simultaneously running SSA campaign. This disappointing performance from online display adverts may once again be the result of the general aversion with which display ads are met on the internet these days (Taylor *et al.,* 2008). Since Chatterjee (2005) did not find any improvements in display advert *click-through rates* for repeating ads, it only seems natural that no improvements can be expected for SSA *click-through rates*. Display adverts have been found to not necessarily increase *click-through rates* to a website, but on a longer term generate meaningful increases in brand awareness and site visitations (Fulgoni *et al*., 2009). Drèze *et al. (*2003) even argued that brand-equity indicators should be used to measure the performance of display ads instead of CTR, because internet users are increasingly avoiding display ads during their online activities. Since display adverts are also employed through an online channel, targeting existing online users to click on them, it may even stand in competition with SSA adverts, eroding the clicks an SSA advert might have received if a display advert were not simultaneously employed.

Similarly no statistical evidence were found to suggest a positive correlation between *click-through rates* for SSA campaigns and complimentary offline radio advertisements. This result comes as a surprise, since offline radio adverts were expected to increase brand awareness, and hence improve the probability for an SSA advert to be clicked on when displayed amongst competing ads. The result do however agree with the findings of McMains *et al. (*2009) that offline campaigns create brand awareness, whilst online campaigns attract and convert potential customers. It also aligns with the research of Wakolbinger *et al. (*2009) who found that combined online and offline advertising strategies do not exhibit improved effectiveness. Once again, segmenting the market into experienced and novice users may provide a reasonable explanation for this result, as

Dou *et al. (*2010) found that lesser skilled internet users tend to evaluate unknown brands on search engine result pages more favourably. For this theory to hold true, we must speculate that traditional offline radio adverts are biased towards the novice internet user segment.

The analysis also found a negative correlation between complimentary offline television advertisements and the *click-through rates* obtained for a simultaneously running SSA campaign. Once again this decrease in CTR stands in contrast with the expected increase in brand awareness gained from television adverts, and also with Gauzente's (2010) findings that internet users who are knowledgeable on a specific sponsored link will have a favourable attitude towards it with a positive click intention. The poor results gained from offline television adverts may be due to consumers' ever decreasing level of tolerance with traditional marketing efforts, as Collins *et al. (*2010) found to be the case for the decreasing effectiveness of magazine adverts. This observation also agrees with Rojas-Méndez *et al.'s* (2005) finding that an increasing number of consumers try to avoid television advertisements.

6.4 Objective 3: Influence of Complimentary Advertisements on Visitor Behaviour

The statistical analysis performed in Chapter 3 found no evidence to suggest that the number of *pages per visit* for SSA campaigns has decreased when employing complimentary online display advertisements. Similarly, a complimentary online display advertisement resulted in no significant changes in the *time spent* on a website for visitors generated through an SSA campaign, or the bounce rate of these visitors. This lack of correlation between online display adverts and the quality of behaviour from visitors

gained through an SSA campaign may once again be due to the possibility that simultaneously running online adverts are in general competing with SSA adverts for clicks gained, and hence the two campaigns may deprive each other from obtaining quality users.

The results did however show that the number of *pages per visit* decreased for SSA campaigns when an offline radio advertisement were used to supplement it, whilst offline radio adverts also exhibited a negative correlation with the time visitors spent on the website. This result also comes as a surprise, since it was expected that increased offline marketing efforts will lead to increased first-time users, who will generally be more explorative, spending more time and visiting more pages on a website. Huang *et al.* *(*2009) postulated that visitors portraying increased engagement with the product or service, and more efficient exposure to branding efforts, will involve greater depth (time per page) and lower breadth (total number of pages). Offline adverts however had a negative correlation with both these metrics at the same time. The bounce rate of visitors to the website also increased during one instance when offline radio adverts were active. During the other instance (which were subject to the same experimental design), no significant difference was found. This may be due to a random sampling error where repetition of the basic experiment sometimes favours one experimental condition, and sometimes the other on a chance basis (Albright *et al.*, 2009). Another possible explanation may be an unclear message delivered in the radio advert, resulting in an increased number of unsatisfied visitors to the website, leaving it soon after not finding what they expected.

6.5 Objective 4: Influence of Complimentary Advertisements on Cost

Online display advertisements did not show any correlation with the *cost-per-click* for a corresponding SSA campaign. Since online display ads also did not influence the impressions gained for an SSA campaign (due to reasons elicited in section 6.2), it can be inferred that display adverts have no correlation with search volumes for a particular topic, hence the demand for keywords will also remain constant, leading to a lack of change in cost-per-click for keywords in an SSA campaign relating to the display advert.

Whilst one of the datasets analysed showed that offline radio advertisements also had no affect on the *cost-per-click* for a simultaneous running SSA campaign, a second comparison showed a positive correlation between complimentary offline radio advertisement and *cost-per-click*. This may be ascribed to the improved awareness that radio adverts generate on a particular topic, whilst not necessarily linking this topic awareness directly to its brand within the customer's mindset. Therefore, instead of potential customers going directly to an advertiser's website (for which the exact URL needs to be known), they would rather tend to first search for the particular topic on a search engine (hence the increased SSA impressions linked to offline radio adverts), prompting increased bids from competitors for these successful keywords, eventually resulting in higher *cost-per-click*. All these "market forces" in play do however react with a lagging effect and may not translate into increased *cost-per-click* within the relatively short periods under investigation in this research.

On the other hand, offline television adverts were shown to have a significant negative correlation with *cost-per-click* for simultaneously running SSA campaigns. Once again

this seems to be linked to the reduced impressions observed over the same period for SSA campaigns employing offline television adverts, which may be due to television adverts resulting in more direct website accesses and decreased searches on the targeted topic, hence less competition and cost involved with clicks.

6.6 Objective 5: Influence of Complimentary Advertisements on Sales

The results obtained from the statistical analysis showed that complimentary online display advertisements had a positive correlation with *new registrations* generated from SSA campaigns. This comes as a surprise, since online display adverts did not show any correlation with impressions, click-through rates nor visitor behaviour. One explanation may be that online display adverts target more experienced online users, who will be more likely to register for new services online whilst taking less time than novice users to first explore a website. Another explanation may be that online display adverts offer a more targeted approach to complimentary advertisements, and increases the awareness and exposure of internet users with a higher probability to convert into customers, similar to the effects found for SSA campaigns by Ghose *et al. (*2009). Likewise McMains *et al.* (2009) found that online campaigns attracted and converted potential customers, where offline campaigns only created brand awareness. Manchanda *et al. (*2006) did however find that banner advertising have a positive effect on repeat internet purchase probabilities, whilst Ilfeld *et al.* (2002) concluded that online advertisement rather generate web-traffic than brand awareness. This result also supports that of Fulgoni *et al*. (2009), who concluded that display advertising can increase the probability of a consumer purchasing an advertised brand online by 27%.

Offline radio advertisements showed to have no significant influence on *new registrations* from users gained through SSA campaigns. This may also be explained by segmenting the target market into experienced internet users and novice internet users, where offline adverts may still be biased towards the latter segment who will be sceptical of registering for online services. This low success rate gained from the SSA campaign further promotes Cudmore *et al.'s* (2009) argument for a pay-per-action (PPA) model, where advertisers only pay per sale of their product.

6.7 Research Question

The aim of this research was to find relationships between complimentary advertising strategies and sponsored search advertisement in order to formulate a model to maximise return on investment achieved from online sponsored search advertisements. The results obtained from statistical analyses of SSA campaign data showed that complimentary online and offline advertisement campaigns can have various different correlations with *impressions*, *click-through rates*, *number of pages visited*, *time spent* visiting a website, *bounce rate*, *cost-per-click* and number of *new registrations* per keyword from visitors gained through the SSA campaign.

Some cross-correlations between these results, as eluded to in the literature study, were however not prevalent in these findings. Where Lin *et al. (*2010) found a positive correlation between the time spent visiting a website and purchases made, and also between purchasing behaviour and the number of web pages viewed at a site during a visit, our results did not show any such correlations.

7 CONCLUSION

7.1 Introduction

This chapter will summarise the findings of this research project, followed by some recommendations on how it can be applied to business, specifically in optimising marketing spend. Limitations of this research are then discussed, followed by suggestions for future research in related fields.

7.2 Findings

The results obtained from this research found that online advertisement campaigns had no significant correlation with the performance of simultaneously running SSA campaigns in terms of *impressions* gained, *click-through rates*, *visitor behaviour* or *cost-per-click* for keywords within the SSA campaign. Complimentary online display advertisements did however show a slight positive correlation with *new registrations* made by customers gained through a simultaneously running SSA campaign. On average the registration rate during times when online display adverts were active were 42 times more than during times when online display adverts were not active. These findings adds to the body of knowledge about sponsored search advertisement on a keyword level, and provided evidence of a relationship between online *registrations* gained through SSA campaigns and online display advertisements. This also provides the online marketer with a theoretical approach to increase return on investment (ROI) in terms of online marketing spend by possibly increasing sales. Despite the limited benefits measured for SSA results when employing complimentary online display ads, exposure to these advertisements are

already beneficial to the firm regardless of click-throughs generated, because consumers will unconsciously build a more favourable attitude towards the brand and are more likely to include the brand in future considerations (Yoo, 2008).

Offline radio adverts were found to have a positive correlation with *impressions* gained for simultaneously running SSA campaigns, whilst at the same time showing a negative correlation with *cost-per-click* for the keywords in these SSA campaigns. On average *impressions* of SSA campaigns improved by 30% when offline radio adverts were active. Offline radio adverts were also found to exhibit a negative correlation with the number of *pages viewed* by website visitors gained through the SSA campaign, which decreased by an average of 14%, whilst the *time* these visitors *spent* viewing the website decreased by 11%. The *bounce rate* of visitors to the website however increased during periods when offline radio adverts were active. Altogether, these findings also provide evidence of a relationship between *impressions* gained for SSA adverts and offline radio advertisements, whilst giving the marketer a theoretical approach to positively influence the return on investment (ROI) in terms of offline marketing spend by increasing brand awareness.

Lastly, offline television adverts were found to have a negative correlation with *impressions* gained from simultaneously running SSA campaigns, which decreased by an average of 18%, whilst at the same time the related *cost-per-clicks* for the keywords in these SSA campaigns decreased by 90%. Offline television adverts were also found to have a negative correlation with the *click-through rate* for simultaneously running SSA campaigns which decreased by 9.4%. These findings add to the body of knowledge about sponsored search advertisement in terms of the impact different offline

advertisement channels may have on SSA performance. It provides the marketing team with improved guidelines on how to spend their offline marketing budget more effectively, with the evidence suggesting television adverts to be a poorly performing complimentary marketing channel when it comes to results obtained from SSA adverts.

7.3 Recommendations

Due to the growing importance of the internet, marketers should increasingly pursue an integrated multi-channel communication strategy to increase advertising effectiveness (Diehl and Terlutter, 2006). Sponsored search advertisement is a very effective way of achieving more targeted advertising at much lower cost (Barnes *et al.,* 2009). Unlike traditional advertising driven by media owners, the targeted nature of sponsored search advertisement requires a much more hands-on approach by firms in order to achieve acceptable results from this medium. Firms, especially internet-based companies, should develop a clear strategy towards sponsored search advertisement in order to develop the skills needed to turn these campaigns into a strategic advantage. These skill-sets should include clear knowledge on the relationships between various complimentary advertising channels and sponsored search advertisements, and how to exploit these other mediums in order to achieve specific results from a sponsored search campaign, whether it is to improve brand awareness, increase sales, or lower cost.

Other techniques to improve results obtained from sponsored search advertisements should also be incorporated into the firms' online marketing strategy. These include improving the quality score of a webpage, which in turn will improve organic rankings and lower bidding costs for keywords (Jansen, 2007), and basing keyword selection on a long

tail distribution in order to improve sponsored search campaign performances (Adriaanse, 2009).

Following are some detailed recommendations that marketing managers may want to exploit in terms of complimentary advertising strategies in order to achieve specific goals for sponsored search advertisement campaigns. The evidence obtained in this research suggests various positive and negative correlations between complimentary advertisements and measured SSA metrics.

This research found a positive correlation between offline radio advertisements and *impressions* gained for sponsored searched advertisements, which in turn is correlated with brand awareness. The number of SSA impressions increased 30% during periods when offline radio advertisements were active. This agrees with the findings of McMains *et al. (*2009) that offline campaigns create brand awareness, whilst online campaigns attract and convert potential customers. Online display adverts however have no correlation with impressions, whilst offline television adverts showed a negative correlation with impressions gained for an SSA campaign.

No online or offline advertisement campaigns showed any positive correlation with *click-through rates* for SSA campaigns. Television adverts in fact showed a negative correlation with *click-through rates* for simultaneously running SSA campaigns.

The quality of the visitors gained through SSA campaigns also did not show significant improvements during any of the periods when online or offline complimentary advertising strategies were active, where quality of a visitor was measured by the *time* they *spent*

viewing the website, number of *pages* they *visited* on the website, or their *bounce rate*. Offline radio adverts in fact showed a negative correlation with the *time spent* and *pages viewed* metrics, and a positive correlation with the *bounce rate*.

A 90% reduction in *cost-per-click* was measured during periods when offline television adverts were active in conjunction with an SSA campaign. A 4% increase in *cost-per-click* was however prevalent during periods when offline radio adverts were active.

Online marketing success should however still be measured by the number of new registrations or products sold (Pfeiffer *et al.,* 2010), which were found to be positively correlated with online display adverts. This research found a 40 fold increase in the rate of *new registrations* during periods when complimentary online display adverts were employed to supplement SSA campaigns.

The results obtained during this research project were used to develop a model for graphically displaying the correlations found between the various complimentary advertising campaigns, and the sponsored search advertisement metrics investigated during this research. Figure 20 shows which of the SSA metrics (*impressions*, *click-through rate*, *pages viewed*, *time spent*, *bounce rate*, *cost-per-click* or *new registrations*) showed a positive or negative correlation with each of the investigated online (display) or offline (radio and television) advertising strategies, and also whether an increment or decrement in the particular metric can be considered as an improvement or impairment in the overall SSA campaign results. The model can be used as a quick index for looking up the correlations that the evidence suggests can be expected between complimentary online and offline advertising strategies and SSA results.

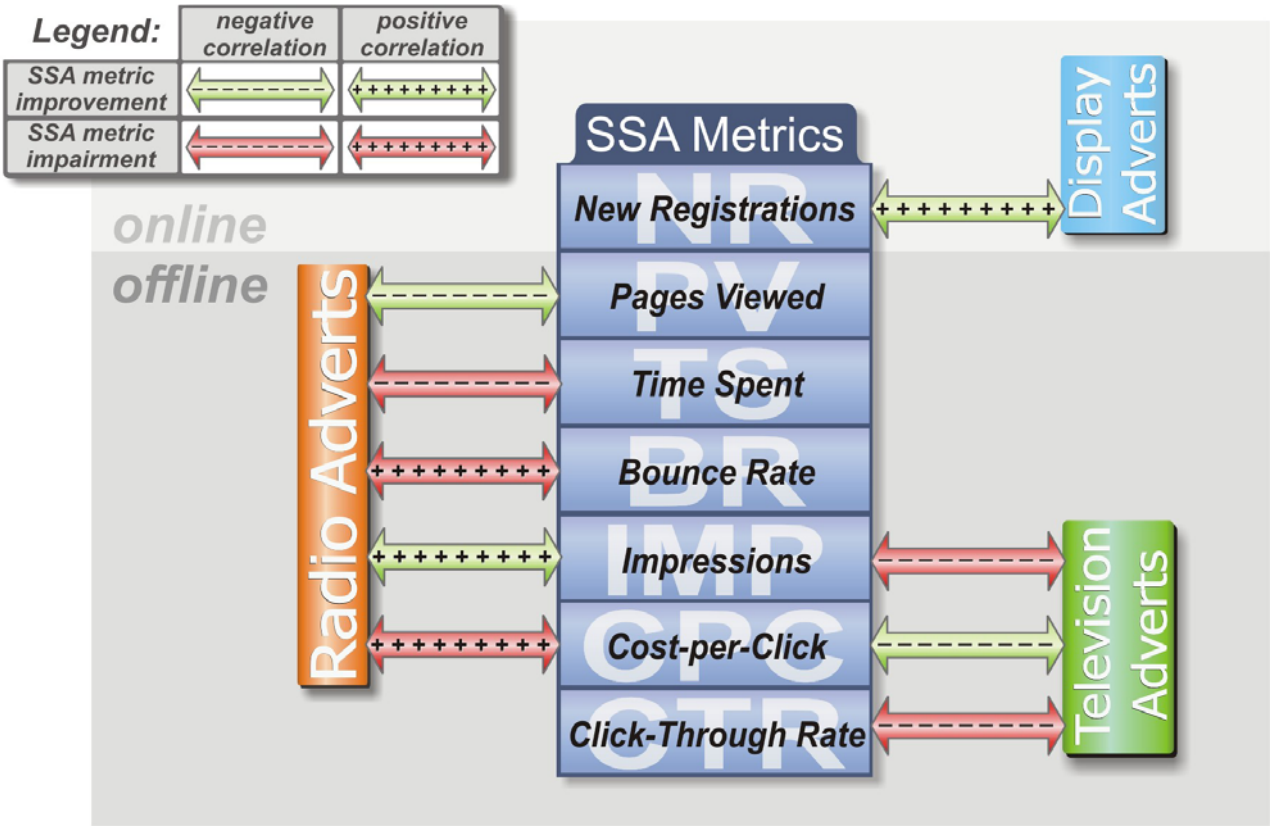


Figure 20: Model correlating SSA metrics with complimentary advertisement campaigns

7.4 Limitations

This research only considered the immediate effects that complimentary advertisements have on the results obtained from SSA campaigns, and not the carry-over improvements advertisements may have on these results a week or two after the complimentary advertisements were run. The research also did not consider how the complimentary advertisements may improve brand recognition or reputation, and its effect on the SSA results.

The research also did not take into account the different strategies online companies follow to select keywords for their SSA campaigns and what influence this might have on the SSA results found in this research.

It was also accepted but not verified that the complimentary advertisement campaigns employed by the various companies used in the research were all related to the core business of the companies. Similarly it was also accepted but not verified that the SSA campaigns employed by the various companies used in the research were all related to their core business, and hence also to the complimentary advertisement campaigns. The quality of their offerings, interactivity, accessibility and relevance of the adverts were not taken into account. Similarly the credibility of the individual firms were ignored together with the interactivity and personalisation of their adverts employed.

Most of the companies used in this research sold services online. A company purely selling its products online were not analysed, and may exhibit different results due to different consumer behaviour.

The research also did not investigate the influence that fluctuations in one of the objectives may have in the results observed in other objectives, for example *cost-per-click* seemed to be directly related to *impressions* gained for an SSA campaign. Proven cross-sectional links may aid in improved explanations of the results observed, an aid in more focused research.

Return on investment (ROI) was defined as visitors who were successfully converted into customers by purchasing a product through the online website or registering for a service.

For some firms, ROI may be defined differently, requiring a different set of metrics to be analysed in order to find successful complimentary advertising strategies for "improved" SSA results.

The SSA results data of only a few firms operating in limited (but diverse) industries were used, each with a unique set of possible external influences. The results obtained from the research may however not be relevant to other firms operating in different industries.

7.5 Suggestions for future research

Although the body of academic knowledge on sponsored search advertisement has grown immensely over the past decade, there are still large gaps for improvement on the subject, in particular regarding other external influences on the results obtained from SSA campaigns.

A similar study to this one should be conducted over longer periods in order to properly account for possible increases in brand awareness gained from the complimentary advertisements, and also exposure to sponsored search advertisements. Such a study may find improved results gained from complimentary offline advertisements over a longer period, not necessarily reflected in short-term direct gains, as investigated in this research.

The influence that a visitor's knowledge about and attitude towards a firm / brand prior to SSA exposure and website visitation have on the SSA results measured should also be

investigated, together with the role complimentary advertisements played in forming this knowledge.

A prevailing question that aroused from analysing the results was the difference in reaction to advertisement campaigns between experienced and novice internet users. Investigation of these differences may provide advertisers with improved criteria for segmenting their target market, where more focused campaigns can lead to improved results obtained from each segment. With focused segmentation, similar research to that performed in this project may find distinctly unique results for each segment, providing marketers with even more focused tools for gaining specific results from their employed SSA campaigns.

Some of the results obtained in this research were in contradiction with current literature. In particular, the influence that increased brand awareness has on the following aspects needs to be revisited:

- Online searches on brand-related topics
- Competition for brand-related keywords and higher related cost
- Direct access to a website versus those generated through search engines

The notion that visitor behaviour is constructed of time spend (TS) viewing a website, number of pages visited (PV) on a website and bounce rate (BR) of visitors needs to be investigated again, especially in terms of visitors gained from search engines. Do visitors who are successfully converted into customers (by buying or registering on the website) indeed spend increased time viewing a website or visit less pages than those visitors who

are not converted? In other words, how desirable are increased TS, decreased PV and decreased BR metrics?

Finally, the influence of SSA campaigns itself on other complimentary marketing activities should be investigated, including how impressions gained for sponsored search adverts influence the brand awareness of firms.

REFERENCES

Adriaanse, J. (2009). The impact of long tail distribution in keyword selection on the effectiveness of sponsored search advertising, *MBA dissertation*, University of Pretoria. Available from: http://upetd.up.ac.za/thesis/available/etd-04072010-132604 [Accessed on 28/09/2010].

Aggarwal, A. (2007). The Most Popular Types Of Online Advertising, *Ezine Articles*, Available from: http://ezinearticles.com/?id=530820 [Accessed 01/03/2010].

Aggarwal, P. and Vaidyanathan, R. (2005). Mirror, Mirror, On the Web: A Lexical-Semantic Analysis of Brand Positioning. *Advances in Consumer Research, 32*(1), 153-154.

Akman, I. and Mishra, A. (2010). Gender, age and income differences in internet usage among employees in organizations, *Computers in Human Behavior*, 26(3), 482-490.

Albright, S. C., Winston, W. L. and Zappe, C. J. (2009). *Data Analysis & Decision Making*. 3rd ed, Cengage Learning.

Ansari, A. and Mela, C.F. (2003). E-Customization, *Journal of Marketing Research*, 40 (2) 131-145.

Barnes, K. (2010). Advertising trends that work. *McClatchy - Tribune Business News*. Available from ABI/INFORM (Document ID: 1961987281).

Barnes, S. and Hair, N. (2009). From banners to YouTube: using the rearview mirror to look at the future of internet advertising. *International Journal of Internet Marketing and Advertising*, 5(3), 223.

Bergemann, D. and Bonatti, A. (2010). Targeting in Advertising Markets: Implications for Offline vs. Online Media. Working Papers -- *Yale School of Management's Economics Research Network*, 1-46.

Bhatnagar, A. and Papatla, P. (2001). Identifying Locations for Targeted Advertising on the Internet, *International Journal of Electronic Commerce*, 5 (3) 23-44.

Brodie, J. R., Winklhofer, H., Coviello, N. E. and Johnston, W. J. (2007). Is e-marketing coming of age? An examination of the penetration of e-marketing and firm performance. *Journal of Interactive Marketing, 21*(1), 2-21.

Bucklin, R. and Sismeiro, C. (2009). Click Here for Interact Insight: Advances in Clickstream Data Analysis in Marketing. *Journal of Interactive Marketing*, 23(1), 35-48.

Carysforth, P. (2005). Regulating online ad impression measurement not a given winner. *Precision Marketing*, 17(22), 14-15.

Chandon, J., Chtourou, M. and Fortin, D. (2003). Effects of Configuration and Exposure Levels on Responses to Web Advertisements. *Journal of Advertising Research*, *43*(2), 217-229.

Chandra, A. (2009). Targeted Advertising: The role of subscriber characteristics in media markets, *The Journal of Industrial Economics*, 57 (1) 58-84.

Chatterjee, P. (2005). Changing Banner Ad Executions on the Web: Impact on Clickthroughs and Communication Outcomes. *Advances in Consumer Research, 32*(1), 51-57.

Chen, J., Liu, D. and Whinston, A. (2009). Auctioning Keywords in Online Search. *Journal of Marketing,* 73(4), 125-141.

Chen, J., Ross, W., Yen, D. and Akhapon, L. (2009). The Effect of Types of Banner Ad, Web Localization and Customer Involvement on Internet Users' Attitudes. *CyberPsychology & Behavior, 12*(1), 71-73.

Collins, J., Dixon, D., Eadie, W., Reggimenti, M., Shiffman, D., Soukhareva, J., et al. (2010). How More Precise Magazine Inputs Can Improve Media Mix Modeling The Impact of More Balanced Metrics on ROI. *Journal of Advertising Research*, *50*(1), 10-15.

Conti, G. (2008). Could Googling Take Down A President? *Communications of the ACM, 51*(1), 71-73.

Cudmore, B., McCoy, J., Shuhy, J. and Taylor, J. (2009). Engaging Online Consumers with an Interactive Cost-Per-Action Advertising Model. *Journal of Internet Commerce*, 8(3/4), 288-308.

Dahlen, M. (2001). Banner Advertisements through a New Lens. *Journal of Advertising Research*, *41*(4), 23-30.

Dai, X. (2007). Google. *New Political Economy, 12*(3), 433-442.

Danaher, P., Mullarkey, G. and Essegaier, S. (2006). Factors Affecting Web Site Visit Duration: A Cross-Domain Analysis. *Journal of Marketing Research (JMR), 43*(2), 182-194.

DataMonitor. (2009). Internet Access in South Africa, Available from http://www.datamonitor.com [Accessed 02/03/2010].

Delman, B., Ostrovsky, M. and Schwarz, M. (2007). Internet Advertising and the Generalized Second-Price Auction: Selling Billions of Dollars Worth of Keywords. *American Economic Review, 97*(1), 242-259.

Diehl, S. and Terlutter, R. (2006). The influence of media on the impact of emotional advertising. *Marketing - Journal of Research and Practice*, 28 (3), 155-68.

Dinev, T., Qing, H. and Yayla, A. (2008). Is There an On-line Advertisers' Dilemma? A Study of Click Fraud in the Pay-Per-Click Model. *International Journal of Electronic Commerce*, 13(2), 29-59.

Dou, W., Lim, K., Su, C., Zhou, N. and Cui, N. (2010). Brand Positioning Strategy Using Search Engine Marketing. *MIS Quarterly, 34*(2), 261-A4.

Drèze, X. and Hussherr, F. (2003). Internet advertising: Is anybody watching*? Journal of Interactive Marketing, 17*(4), 8-23.

Edelman B., Ostrovsky, M. and Schwarz, M. (2007). Internet Advertising and the Generalized Second-Price Auction: Selling Billions of Dollars Worth of Keyword, *American Economic Review*. 97 (1) 242-259.

Fain, D.C. and Pedersen, J.O. (2006). Sponsored Search: A Brief History, *Bulletin of the American Society for Information Science and Technology*, 32 (2) 12-13.

Feng, J., Bhargava, H. and Pennock, D. (2007). Implementing Sponsored Search in Web Search Engines: Computational Evaluation of Alternative Mechanisms. *INFORMS Journal on Computing, 19*(1), 137-148.

Ferguson, R. and Hlavinka, K. (2006). The long tail of loyalty: how personalized dialogue and customized rewards will change marketing forever, *The Journal of Consumer Marketing*, 23 (6) 357-361.

Fjell, K. (2010). Online advertising: Pay-per-view versus pay-per-click with market power. *Journal of Revenue & Pricing Management*, 9(3), 198-203.

Fourquet-Courbet, M., Courbet, D. and Vanhuele, M. (2007). How Web Banner Designers Work: The Role of Internal Dialogues, Self-Evaluations and Implicit Communication Theories. *Journal of Advertising Research, 47*(2), 183-192.

Fulgoni, G. M. and Mörn M. P. (2009). Whither the Click? How Online Advertising Works. *Journal of Advertising Research*, *49*(2), 134-142.

Gauzente, C. (2010). The intention to click on sponsored ads—A study of the role of prior knowledge and of consumer profile. *Journal of Retailing & Consumer Services*, 17(6), 457-463.

Ghose, A. and Yang, S. (2009). An Empirical Analysis of Search Engine Advertising: Sponsored Search in Electronic Markets. *Management Science*, *55*(10), 1605-1622.

Graham, J. and Havlena, W. (2007). Finding the "Missing Link": Advertising's Impact on Word of Mouth, Web Searches and Site Visits. *Journal of Advertising Research*, *47*(4), 427-435.

Griffiths, T., Steyvers, M. and Firl, A. (2007). Google and the Mind: Predicting Fluency With PageRank. *Psychological Science (Wiley-Blackwell), 18*(12), 1069-1076.

Ha, L. (2003). Crossing Offline and Online Media: A Comparison of Online Advertising on TV Web Sites and Online Portals. *Journal of Interactive Advertising*, 3 (2), 24-35.

Havlena, W. and Graham, J. (2004). Decay Effects in Online Advertising: Quantifying the Impact of Time Since Last Exposure on Branding Effectiveness. *Journal of Advertising Research*, *44*(4), 327-332.

Hoffman, D.L. and Novak, T.P. (2000). When exposure-based Web advertising stops making sense. Nashville, eLab. Available from: http://www.weima.org/download/when exposure based web advertising stops making sense.pdf [Accessed on 28/02/2010].

Hollis, N. (2005). Ten Years of Learning on How Online Advertising Build Brands, *Journal of Advertising Research*, 45 (2) 255-2686.

Huang, P., Lurie, N. and Mitra, S. (2009). Searching for Experience on the Web: An Empirical Examination of Consumer Behavior for Search and Experience Goods. *Journal of Marketing*, *73*(2), 55-69.

Ibeh, K., Ying, L. and Dinnie, K. (2005). E-branding strategies of internet companies: Some preliminary insights from the UK. *Journal of Brand Management, 12*(5), 355-373.

Ilfeld, J.S and Winer, R.S. (2002). Generating Website Traffic, *Journal of Advertising Research*, 42 (5) 49-61.

Interactive Advertising Bureau. (2009). *IAB Internet Advertising Revenue Report, 2009*. Available from: www.iab.net/media/file/IAB-Ad-Revenue-Sixmonth-2009.pdf, [Accessed 21/04/2010].

Iyer, G., Soberman, D. and Villas-Boas, J.M. (2005). The Targeting of Advertising, *Marketing Science*, 24 (3) 461-476.

Jansen, B.J. (2007). The Comparative Effectiveness of Sponsored and Non-sponsored Links for Web ECommerce Queries, *ACM Transactions on the Web*, 1 (1) Article 3 p1-25.

Jansen, B.J. and Mullen, T. (2008) Sponsored Search: an overview of the concept, history and technology, *International Journal Electronic Business*, 6 (2) 114-131.

Jansen, B.J. and Resnick, M. (2006). An Examination of Searcher's Perceptions of Nonsponsored and Sponsored Links During Ecommerce Web Searching, *Journal Of The American Society For Information Science And Technology*, 57(14) 1949–1961.

Josey, J. (2009). Types of Adverting Supported by the Internet, Available from: http://www.slideshare.net/jodiejosey/types-of-online-advertising [Accessed 21/02/2010].

Kazienko, P. and Adamski, M. (2007). Adaptive personalization of web advertising. *Information Sciences*, 177 (11) 2269-2295.

Keane, M., O'Brien, M. and Smyth, B. (2008). Are People Biased In Their Use Of Search Engines?. *Communications of the ACM, 51*(2), 49-52.

Kim, Y., Street, W.N., Russell, G.J. and Menczer, F. (2005). Customer Targeting: A Neural Network Approach Guided by Genetic Algorithms, *Management Science*, 51 (2), 264-276.

Kink, N. and Hess, T. (2008). Search Engines as Substitutes for Traditional Information Sources? An Investigation of Media Choice. *Information Society, 24*(1), 18-29.

La Ferle, C., Edwards, S. and Wei-Na, L. (2000). Teens' Use of Traditional Media and the Internet. *Journal of Advertising Research*, *40*(3), 55-65.

Lewandowski, D. (2008). Search engine user behaviour: How can users be guided to quality content?. *Information Services & Use, 28*(3/4), 261-268.

Lin, L., Jen-Hwa, H. P., Sheng, O. L. and Lee, J. (2010). Is Stickiness Profitable for Electronic Retailers? *Communications of the ACM, 53*(3), 132-136.

Lin, Y. and Chen, Y. (2009). Effects of ad types, positions, animation lengths and exposure times on the click-through rate of animated online advertisings, *Computers & Industrial Engineering*, 57(2), 580-591.

Lohtia, R., Donthu, N and Hershberger, E. (2003). The Impact of Content and Design Elements on Banner Advertising Click-through Rates. *Journal of Advertising Research*, *43*(4), 410-418.

Mack, A. (2000). More Online Ads Equal More Visitors, Survey Says. *Adweek Eastern Edition*, 41(29), 60.

Mahdian, M. and Tomak, K. (2008). Pay-Per-Action Model for On-line Advertising. *International Journal of Electronic Commerce, 13*(2), 113-128.

Malaga, R. (2008). Worst Practices in Search Engine Optimization. *Communications of the ACM, 51*(12), 147-150.

Manchanda, P., Dubé, J., Goh, K. and Chintagunta, P. (2006). The Effect of Banner Advertising on Internet Purchasing. *Journal of Marketing Research (JMR)*, *43*(1), 98-108. doi:10.1509/jmkr.43.1.98.

Martin, B., Van Durme, J., Raulas, M. and Merisavo, M. (2003). Email Advertising: Exploratory Insights from Finland. *Journal of Advertising Research*, *43*(3), 293-300.

Matin, S. (2007). Clicks Ahoy! Navigating Online Advertising in a Sea of Fraudulent Clicks. *Berkeley Technology Law Journal*, 22(1), 533-554.

McMains, A. and Morrissey, B. (2009). Online Brands Turn To Traditional Ads. *Adweek*, *50*(25), 7.

McCoy, S., Everard, A., Polak, P. and Galleta, D. (2007). The Effects Of Online Advertising. *Communications of the ACM, 50*(3), 84-88.

Mehta, A., Saberi, A., Vazirani, U. and Vazirani, V. (2007). AdWords and Generalized Online Matching. *Journal of the ACM, 54*(5), 1-19.

Midha, V. (2008). The Glitch in On-line Advertising: A Study of Click Fraud in Pay-Per-Click Advertising Programs. *International Journal of Electronic Commerce*, 13(2), 91-111.

Naik, P. and Raman, K. (2003). Understanding the Impact of Synergy in Multimedia Communications. *Journal of Marketing Research (JMR)*, *40*(4), 375-388.

NCSS (2007). *NCSS T-Tests Procedure* [Internet] NCSS. Available from http://www.ncss.com/t-tests.html [Accessed 21/02/2010].

Nutley, M. (2005). Recognising that online advertising can match offline. *New Media Age*, 12.

O'Brien, M. and Keane, M.T. (2007). Modelling user behaviour using a search engine. *Proceedings of the 12th International Conference on Intelligent User Interfaces*, January 28-31, 2007, Honolulu, Hawaii, USA.

Pfeiffer, M. and Zinnbauer, M. (2010). Can Old Media Enhance New Media? How Traditional Advertising Pays off for an Online Social Network. *Journal of Advertising Research*, *50*(1), 42-49.

Poritz, J. (2007). Who Searches the Searchers? Community Privacy in the Age of Monolithic Search Engines. *Information Society, 23*(5), 383-389.

Robinson, H., Wysocka, A. and Hand, C. (2007). Internet advertising effectiveness. *International Journal of Advertising*, *26*(4), 527-541.

Rojas-Méndez, J. and Davies, G. (2005). Avoiding Television Advertising: Some Explanations from Time Allocation Theory. *Journal of Advertising Research*, *45*(1), 34-48.

Rosenkrans, G. (2009). The Creativeness and Effectiveness of Online Interactive Rich Media Advertising. *Journal of Interactive Advertising*, *9*(2), 66-83.

Rubinson, J. and Pfeiffer, M. (2005). Brand Key Performance Indicators as a Force for Brand Equity Management. *Journal of Advertising Research*, *45*(2), 187-197.

Rust, R.T. and Varki, S. (1996). Rising from the Ashes of Advertising, *Journal of Business Research*, 37(3) 173-181.

Rutz, O.J. and Bucklin, R.E. (2007). A Model of Individual Keyword Performance in Paid Search Advertising. USA. Available from http://ssrn.com/abstract=1024765 [Accessed 15/09/2010].

Sen, R. (2005). Optimal Search Engine Marketing Strategy. *International Journal of Electronic Commerce*, *10*(1), 9-25.

Shakya, A. (2008). Different Types of Online Advertisement, *Ezine Articles*, Available from: http://ezinearticles.com/?id=1046027 [Accessed 01/03/2010].

Sherman, L. and Deighton, J. (2001). Banner advertising: Measuring Effectiveness and Optimizing Placement, *Journal of Interactive Marketing*, 15 (2) 60-64.

Taylor, N., Loiacono, E. and Watson, R. (2008). Alternative Scenarios to the "banner" years. *Communications of the ACM, 51*(2), 53-58.

Wakolbinger, L., Denk, M. and Oberecker, K. (2009). The Effectiveness of Combining Online and Print Advertisements. *Journal of Advertising Research*, *49*(3), 360-372.

Weide, K. (2009). Worldwide and U.S. Internet Advertising 2009–2013 Forecast and Analysis, IDC Doc # 218271, Framingham, Massachusetts, USA: IDC Available from: http://www.idc.com/getdoc.jsp?&containerId=218271 [Accessed 02/03/2010].

Wilbur, K. and Yi, Z. (2009). Click Fraud. *Marketing Science*, 28(2), 293-308.

Wolk, A. and Theysohn, S. (2007). Factors influencing website traffic in the paid content market. *Journal of Marketing Management*, 23(7/8), 769-796.

Yaveroglu, I. and Donthu, N. (2008). Advertising Repetition and Placement Issues in On-Line Environments. *Journal of Advertising, 37*(2), 31-43.

Yoo, C. Y. (2008). Unconscious processing of Web advertising: effects on implicit memory, attitude towards the brand and consideration set, *Journal of Interactive Marketing*, 22 (2) 2-18.

Yoo, C. Y. (2009). Effects beyond click-through: Incidental exposure to web advertising. *Journal of Marketing Communications*, 15(4), 227-246.

Yoo, C. Y., Kim, K. (2005). Processing of animation in online banner advertising: The roles of cognitive and emotional responses. *Journal of Interactive Marketing, 19*(4), 18-34.

Zikmund, G. W. (2003). Theory Building, *Business Research Methods*, 7th Edition, Chapter 3. Oklahoma: South-Western.

APPENDICES

A.1 Objective 1.1.1: Statistical Results - Impressions for Online Display Adverts

Paired T-Test Report

Variable X1 = IMP_{on+}, X2 = IMP_{on-}

Descriptive Statistics Section

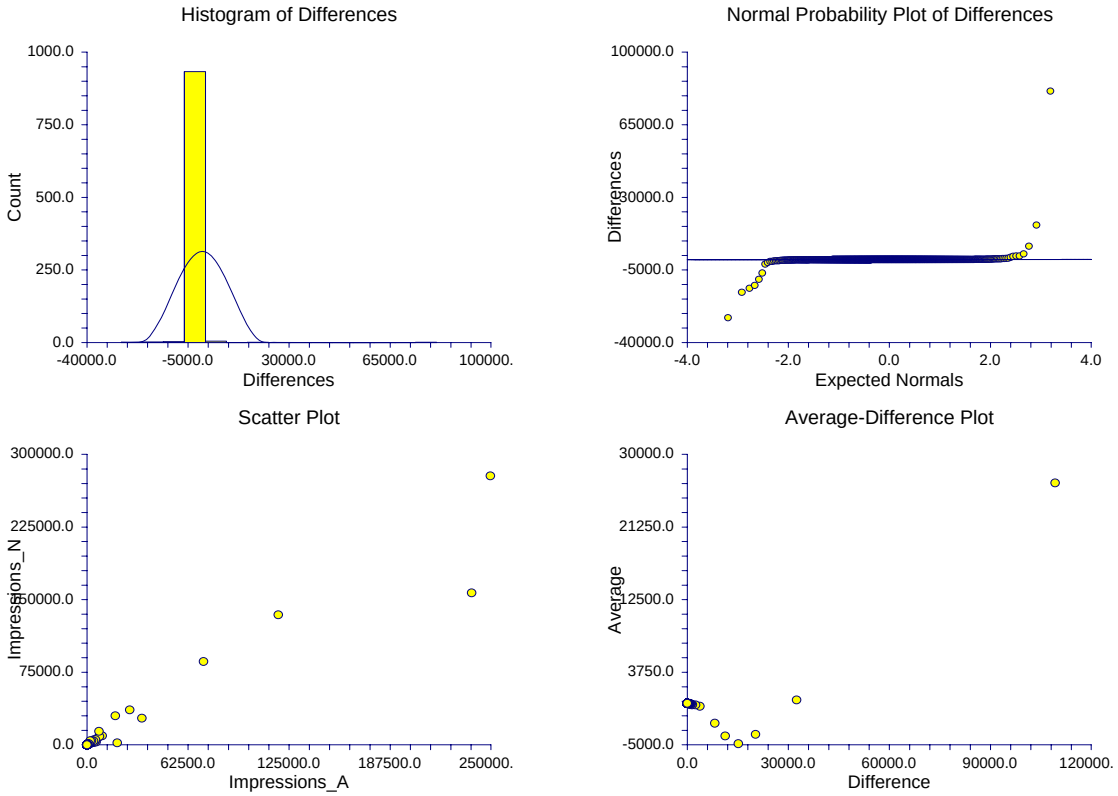
Variable	Count	Mean	Standard Deviation	Standard Error	95.0% LCL of Mean	95.0% UCL of Mean
IMP_{on+}	946	996.3943	12189.15	396.3034	217.769	1775.02
IMP_{on-}	946	978.1311	11726.46	381.2602	229.0616	1727.201
Difference	946	18.26321	2992.785	97.30384	-172.9116	209.438

T for Confidence Limits = 1.9647

T-Test For Difference Between Means Section

Alternative Hypothesis	T-Value	Prob Level	Reject H0 at .050	Power (Alpha=.05)	Power (Alpha=.01)
IMP_{on+} - IMP_{on-} < > 0	0.1877	0.851158	No	0.054045	0.011326
IMP_{on+} - IMP_{on-} < 0	0.1877	0.574421	No	0.033435	0.005968
IMP_{on+} - IMP_{on-} > 0	0.1877	0.425579	No	0.072536	0.016232

Plots Section



A.2 Objective 1.2.1.a: Statistical Results - Impressions for Offline Radio Adverts (a)

Paired T-Test Report

Variable X1 = IMP_{off+a}, X2 = IMP_{off-a}

Descriptive Statistics Section

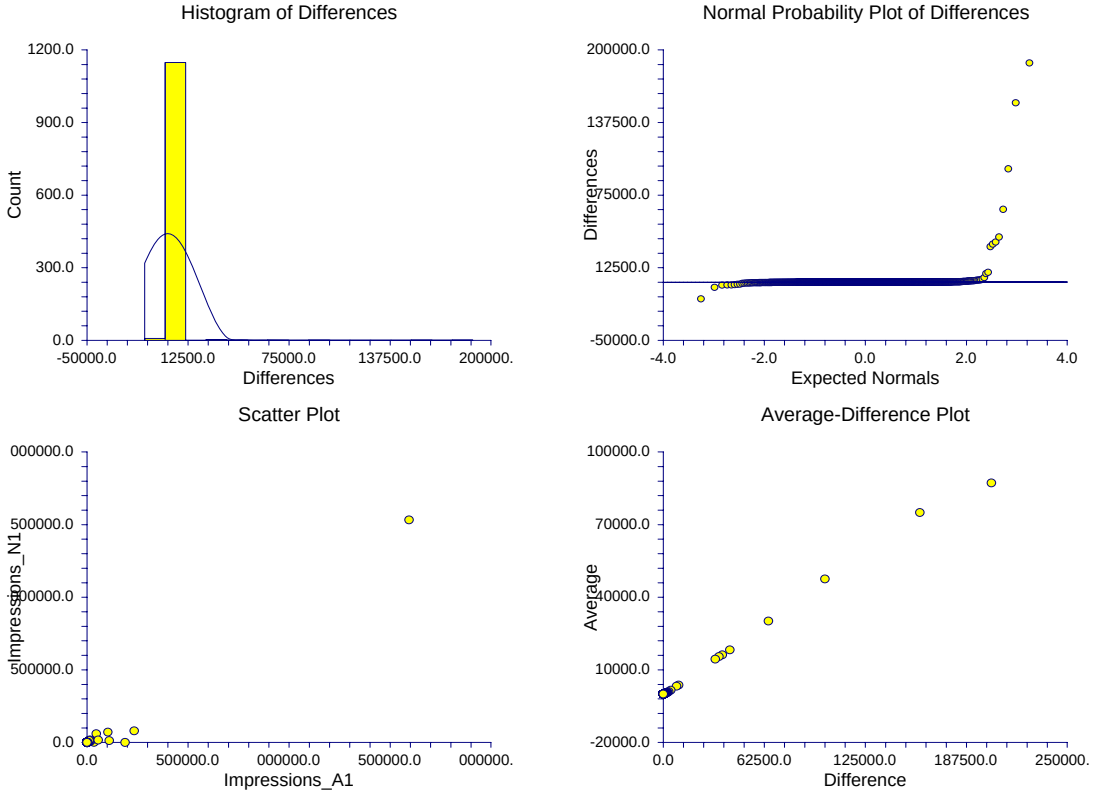
Variable	Count	Mean	Standard Deviation	Standard Error	95.0% LCL of Mean	95.0% UCL of Mean
IMP_{off+a}	1164	2474.445	47827.95	1401.862	-279.8211	5228.711
IMP_{off-a}	1164	1919.4	45057.31	1320.653	-675.313	4514.114
Difference	1164	555.0447	8174.957	239.6122	84.27377	1025.816

T for Confidence Limits = 1.9647

T-Test For Difference Between Means Section

Alternative Hypothesis	T-Value	Prob Level	Reject H0 at .050	Power (Alpha=.05)	Power (Alpha=.01)
IMP_{off+a} - IMP_{off-a} <> 0	2.3164	0.020708	Yes	0.639263	0.397664
IMP_{off+a} - IMP_{off-a} < 0	2.3164	0.989646	No	0.000037	0.000002
IMP_{off+a} - IMP_{off-a} > 0	2.3164	0.010354	Yes	0.749073	0.496043

Plots Section



A.3 Objective 1.2.1.b: Statistical Results - Impressions for Offline Radio Adverts (b)

Paired T-Test Report

Variable X1 = IMP_{off+b}, X2 = IMP_{off-b}

Descriptive Statistics Section

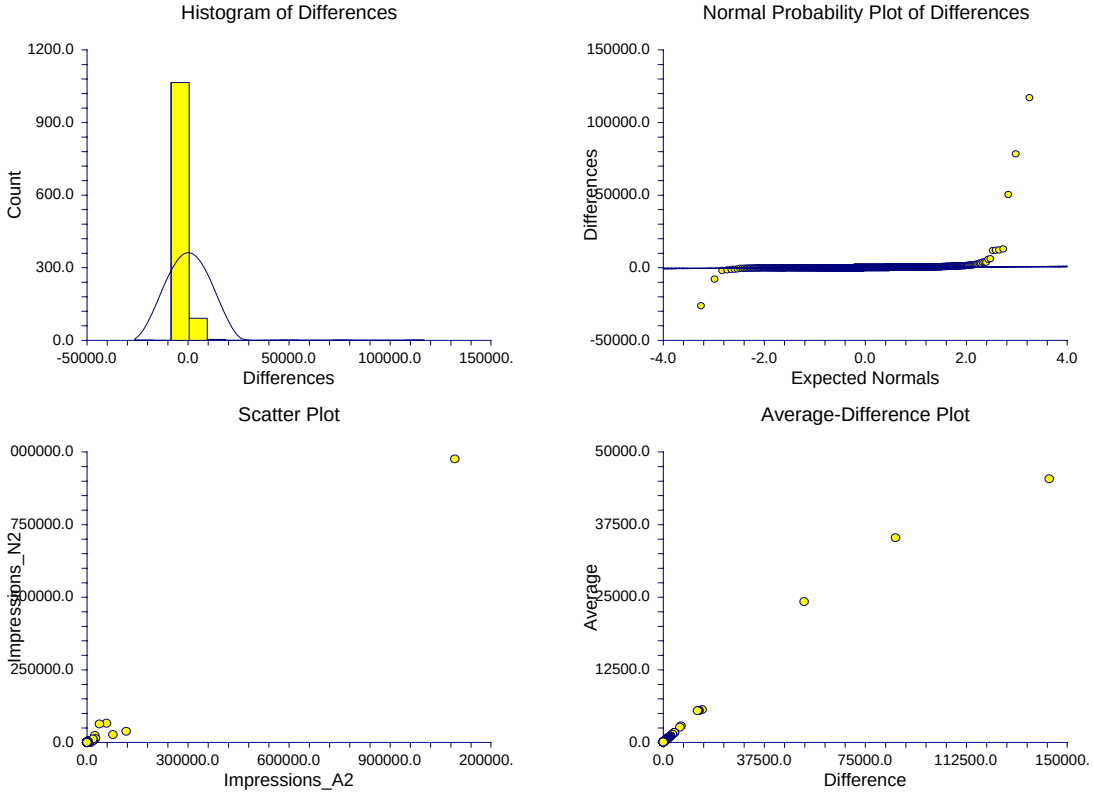
Variable	Count	Mean	Standard Deviation	Standard Error	95.0% LCL of Mean	95.0% UCL of Mean
IMP_{off+b}	1164	1790.748	32366.76	948.6865	-73.15482	3654.651
IMP_{off-b}	1164	1371.441	28760.27	842.9786	-284.776	3027.657
Difference	1164	419.3076	4525.36	132.6407	158.7058	679.9093

T for Confidence Limits = 1.9647

T-Test For Difference Between Means Section

Alternative Hypothesis	T-Value	Prob Level	Reject H0 at .050	Power (Alpha=.05)	Power (Alpha=.01)
IMP_{off+b} - IMP_{off-b} <> 0	3.1612	0.001612	Yes	0.885176	0.720861
IMP_{off+b} - IMP_{off-b} <0	3.1612	0.999194	No	0.000001	0.000000
IMP_{off+b} - IMP_{off-b} >0	3.1612	0.000806	Yes	0.935288	0.798108

Plots Section



A.4 Objective 1.2.2: Statistical Results - Impressions for Offline Television Adverts

Paired T-Test Report

Variable X1 = IMP_{off+}, X2 = IMP_{off-}

Descriptive Statistics Section

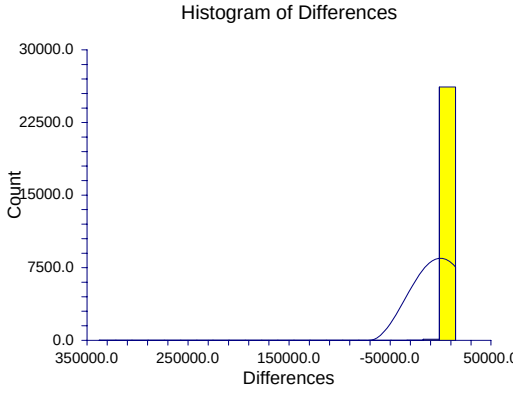
Variable	Count	Mean	Standard Deviation	Standard Error	95.0% LCL of Mean	95.0% UCL of Mean
IMP_{off+}	26281	208.6706	3292.69	20.31094	168.7653	248.5759
IMP_{off-}	26281	254.2412	4374.089	26.98154	201.23	307.2523
Difference	26281	-45.5706	2436.587	15.03007	-75.10048	-16.04073

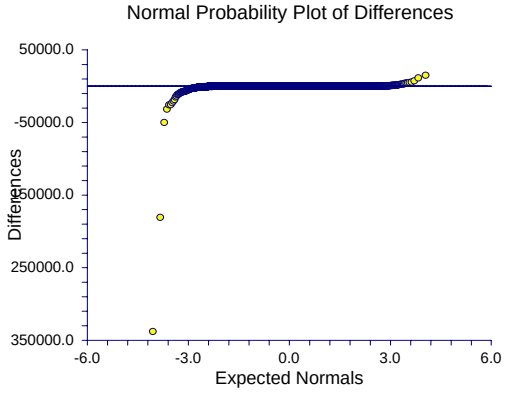
T for Confidence Limits = 1.9647

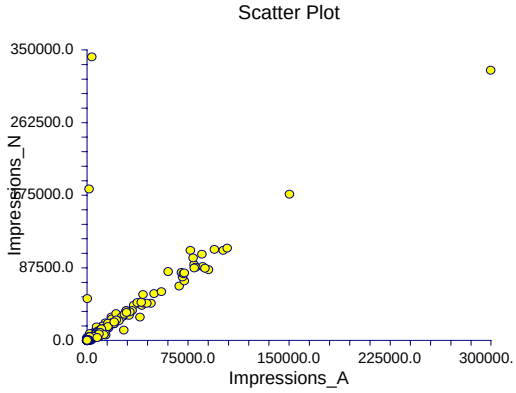
T-Test For Difference Between Means Section

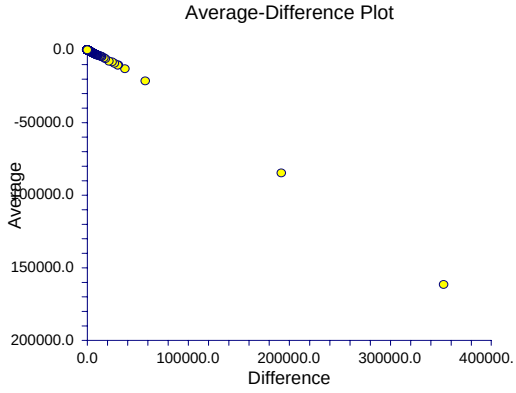
Alternative Hypothesis	T-Value	Prob Level	Reject H0 at .050	Power (Alpha=.05)	Power (Alpha=.01)
IMP_{off+} - IMP_{off-} <> 0	-3.0320	0.002430	Yes	0.858140	0.675853
IMP_{off+} - IMP_{off-} < 0	-3.0320	0.001215	Yes	0.917296	0.759786
IMP_{off+} - IMP_{off-} > 0	-3.0320	0.998785	No	0.000001	0.000000

Plots Section









A.5 Objective 2.1: Statistical Results – CTR for Online Display Adverts

Paired T-Test Report
Variable X1 = CTR_{on+}, X2 = CTR_{on-}

Descriptive Statistics Section

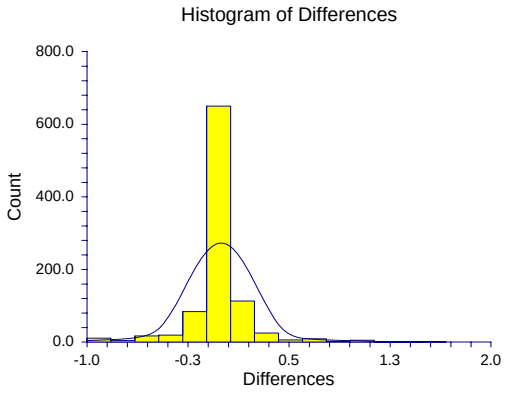
Variable	Count	Mean	Standard Deviation	Standard Error	95.0% LCL of Mean	95.0% UCL of Mean
CTR_{on+}	946	0.1211192	0.1793812	5.832185E-03	0.1096606	0.1325778
CTR_{on-}	946	0.1303023	0.1852391	6.022643E-03	0.1184695	0.1421351
Difference	946	-9.183106E-03	0.213512	6.941873E-03	-2.282194E-02	4.455728E-03

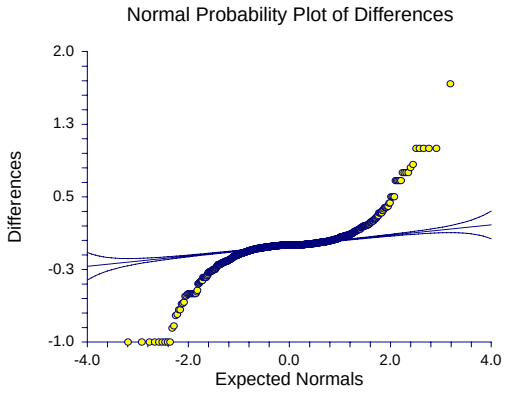
T for Confidence Limits = 1.9647

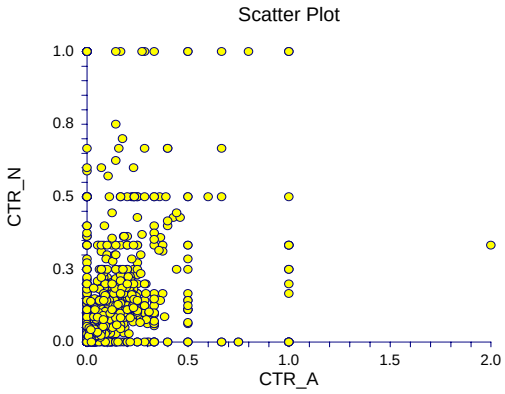
T-Test For Difference Between Means Section

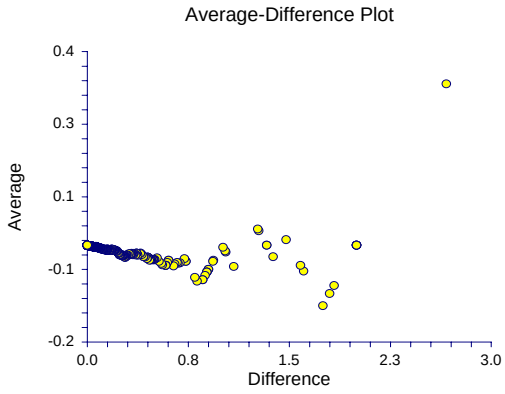
Alternative Hypothesis	T-Value	Prob Level	Reject H0 at .050	Power (Alpha=.05)	Power (Alpha=.01)
CTR_{on+} - CTR_{on-} <> 0	-1.3229	0.186203	No	0.262542	0.105156
CTR_{on+} - CTR_{on-} < 0	-1.3229	0.093101	No	0.373728	0.157812
CTR_{on+} - CTR_{on-} > 0	-1.3229	0.906899	No	0.001500	0.000132

Plots Section









A.6 Objective 2.2.1.a: Statistical Results – CTR for Offline Radio Adverts (a)

Paired T-Test Report
Variable X1 = CTR_{off+a}, X2 = CTR_{off-a}

Descriptive Statistics Section

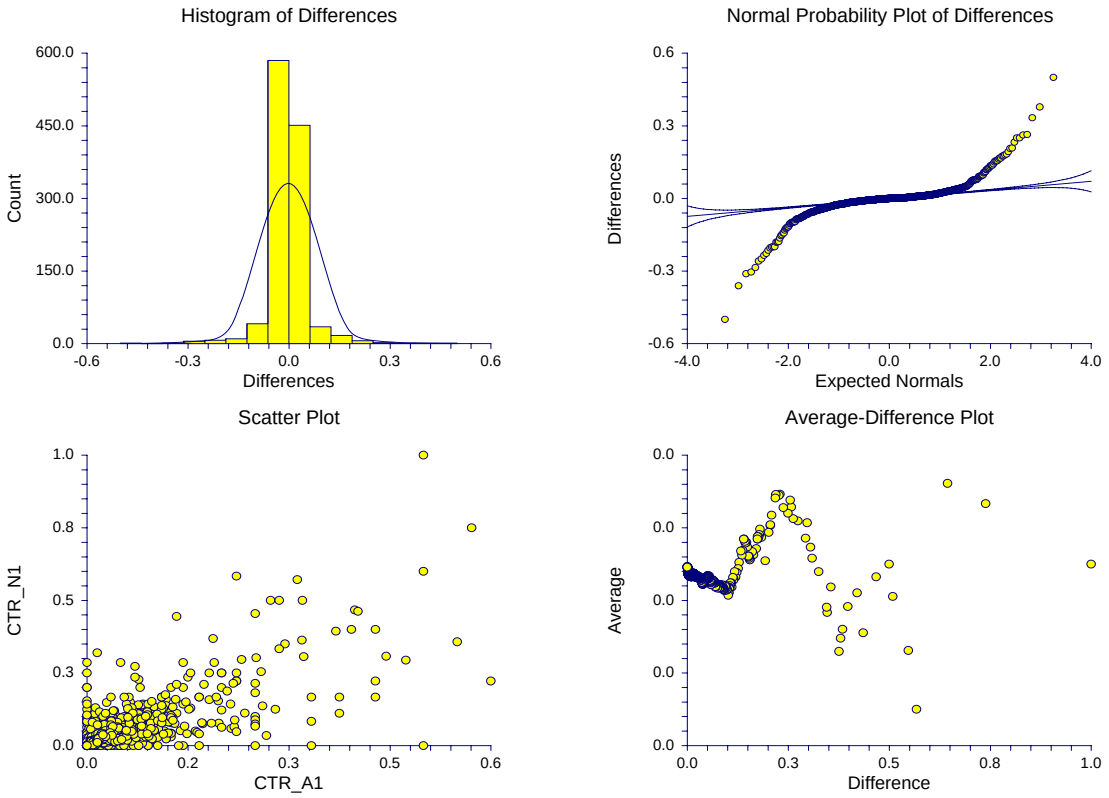
Variable	Count	Mean	Standard Deviation	Standard Error	95.0% LCL of Mean	95.0% UCL of Mean
CTR_{off+a}	1164	5.353727E-02	7.297245E-02	2.13886E-03	4.933501E-02	5.773953E-02
CTR_{off-a}	1164	5.499537E-02	7.876384E-02	2.308609E-03	5.045959E-02	5.953113E-02
Difference	1164	-1.458091E-03	5.665522E-02	1.660594E-03	-4.720693E-03	1.80451E-03

T for Confidence Limits = 1.9647

T-Test For Difference Between Means Section

Alternative Hypothesis	T-Value	Prob Level	Reject H0 at .050	Power (Alpha=.05)	Power (Alpha=.01)
CTR_{off+a} - CTR_{off-a} <>0	-0.8781	0.380096	No	0.141916	0.045051
CTR_{off+a} - CTR_{off-a} <0	-0.8781	0.190048	No	0.221600	0.073767
CTR_{off+a} - CTR_{off-a} >0	-0.8781	0.809952	No	0.005819	0.000677

Plots Section



A.7 Objective 2.2.1.b: Statistical Results – CTR for Offline Radio Adverts (b)

Paired T-Test Report
Variable X1 = CTR_{off+b}, X2 = CTR_{off-b}

Descriptive Statistics Section

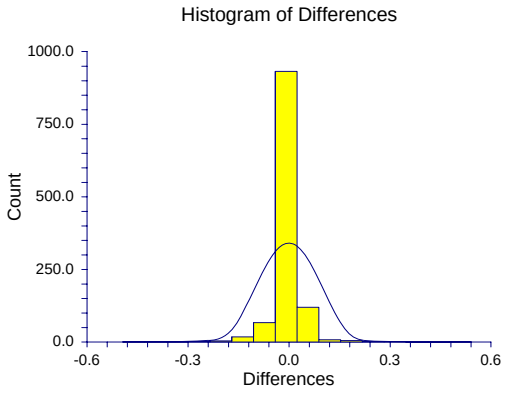
Variable	Count	Mean	Standard Deviation	Standard Error	95.0% LCL of Mean	95.0% UCL of Mean
CTR_{off+b}	1164	4.506368E-02	6.705208E-02	1.965331E-03	4.120236E-02	4.892501E-02
CTR_{off-b}	1164	4.638977E-02	7.021726E-02	2.058104E-03	4.234618E-02	5.043337E-02
Difference	1164	-1.32609E-03	4.861851E-02	1.425034E-03	-4.125882E-03	1.473702E-03

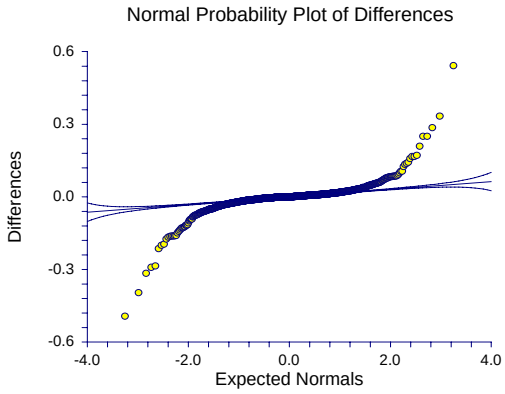
T for Confidence Limits = 1.9647

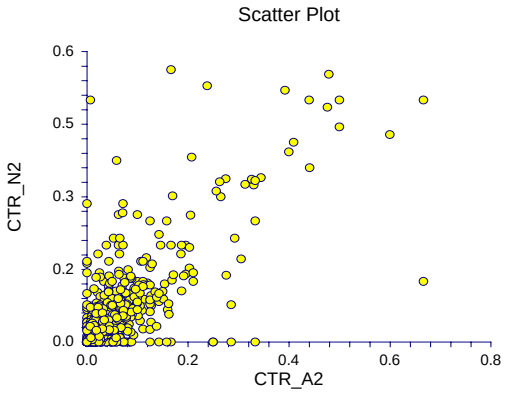
T-Test For Difference Between Means Section

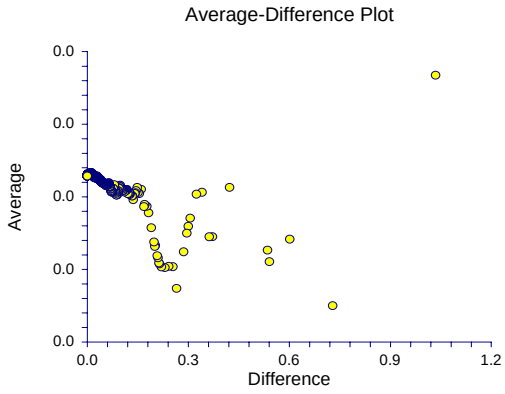
Alternative Hypothesis	T-Value	Prob Level	Reject H0 at .050	Power (Alpha=.05)	Power (Alpha=.01)
CTR_{off+b} - CTR_{off-b} <> 0	-0.9306	0.352270	No	0.153570	0.050185
CTR_{off+b} - CTR_{off-b} < 0	-0.9306	0.176135	No	0.237525	0.081390
CTR_{off+b} - CTR_{off-b} > 0	-0.9306	0.823865	No	0.005006	0.000563

Plots Section









A.8 Objective 2.2.2: Statistical Results - CTR for Offline Television Adverts

Paired T-Test Report
Variable X1 = CTR_{off+}, X2 = CTR_{off-}

Descriptive Statistics Section

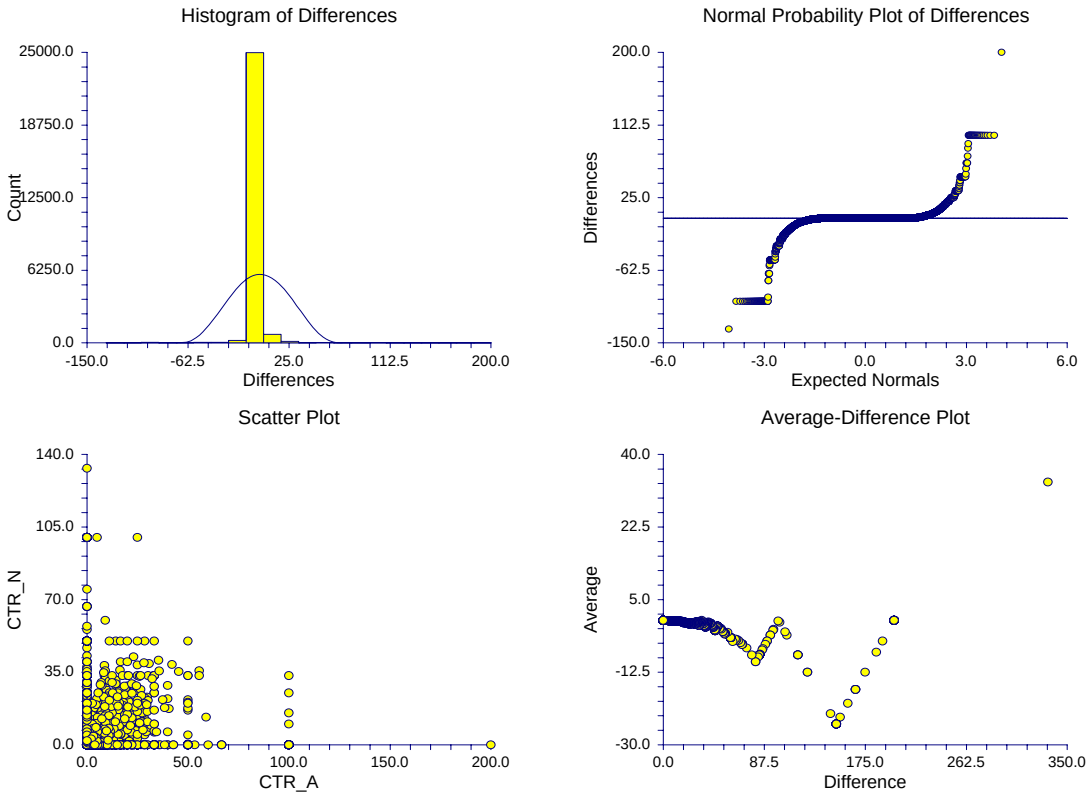
Variable	Count	Mean	Standard Deviation	Standard Error	95.0% LCL of Mean	95.0% UCL of Mean
CTR_{off+}	26281	1.056231	5.306477	3.273297E-02	0.9919204	1.120543
CTR_{off-}	26281	1.170202	6.046772	3.729947E-02	1.096919	1.243485
Difference	26281	-0.1139702	7.273945	4.486928E-02	-0.2021257	-2.581461E-02

T for Confidence Limits = 1.9647

T-Test For Difference Between Means Section

Alternative Hypothesis	T-Value	Prob Level	Reject H0 at .050	Power (Alpha=.05)	Power (Alpha=.01)
CTR_{off+} - CTR_{off-} <> 0	-2.5400	0.011084	Yes	0.719075	0.485729
CTR_{off+} - CTR_{off-} < 0	-2.5400	0.005542	Yes	0.814659	0.584610
CTR_{off+} - CTR_{off-} > 0	-2.5400	0.994458	No	0.000014	0.000001

Plots Section



A.9 Objective 3.1: Statistical Results – PV for Online Display Adverts

Paired T-Test Report
Variable X1 = PV_{on+} , X2 = PV_{on-}

Descriptive Statistics Section

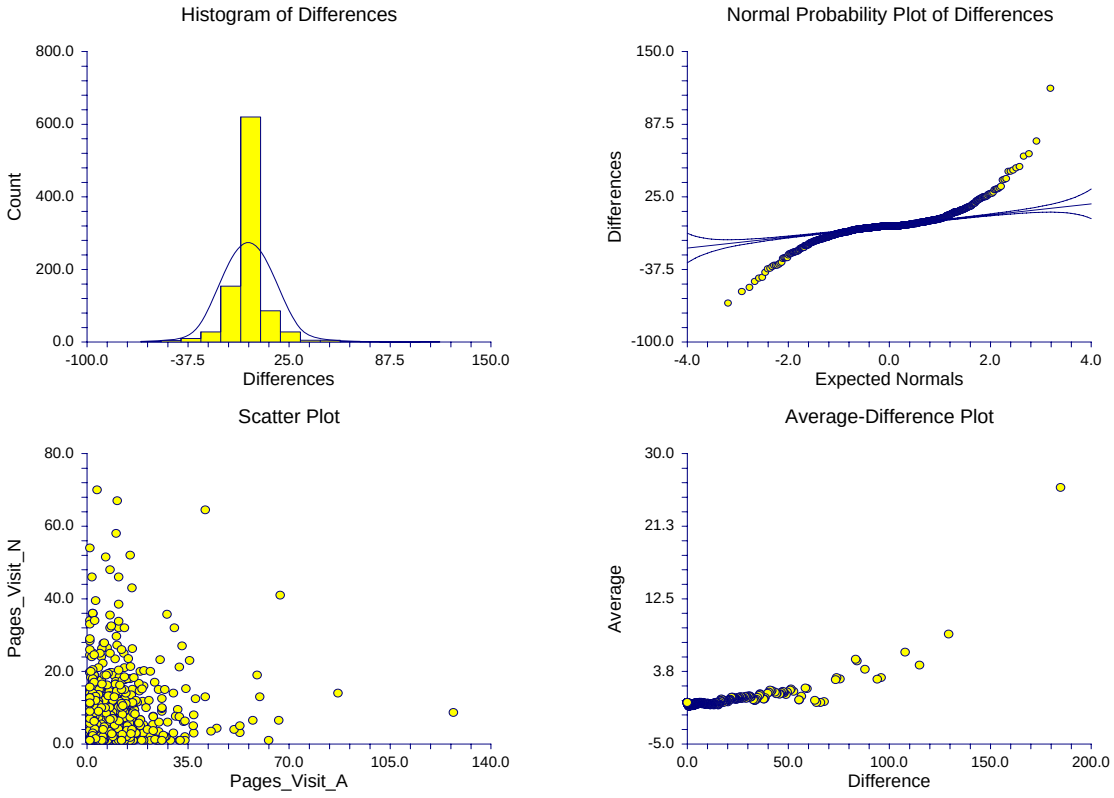
Variable	Count	Mean	Standard Deviation	Standard Error	95.0% LCL of Mean	95.0% UCL of Mean
PV_{on+}	946	7.551699	10.14598	0.3298744	6.903588	8.19981
PV_{on-}	946	7.390146	8.70246	0.2829414	6.834245	7.946046
Difference	946	0.1615532	12.20865	0.3969374	-0.6183177	0.9414241

T for Confidence Limits = 1.9647

T-Test For Difference Between Means Section

Alternative Hypothesis	T-Value	Prob Level	Reject H0 at .050	Power (Alpha=.05)	Power (Alpha=.01)
PV_{on+} - PV_{on-} <> 0	0.4070	0.684101	No	0.069183	0.016476
PV_{on+} - PV_{on-} < 0	0.4070	0.657950	No	0.020092	0.003135
PV_{on+} - PV_{on-} > 0	0.4070	0.342050	No	0.107885	0.027470

Plots Section



A.10 Objective 3.2.a: Statistical Results – PV for Offline Radio Adverts (a)

Paired T-Test Report
Variable X1 = PV_{off+a}, X2 = PV_{off-a}

Descriptive Statistics Section

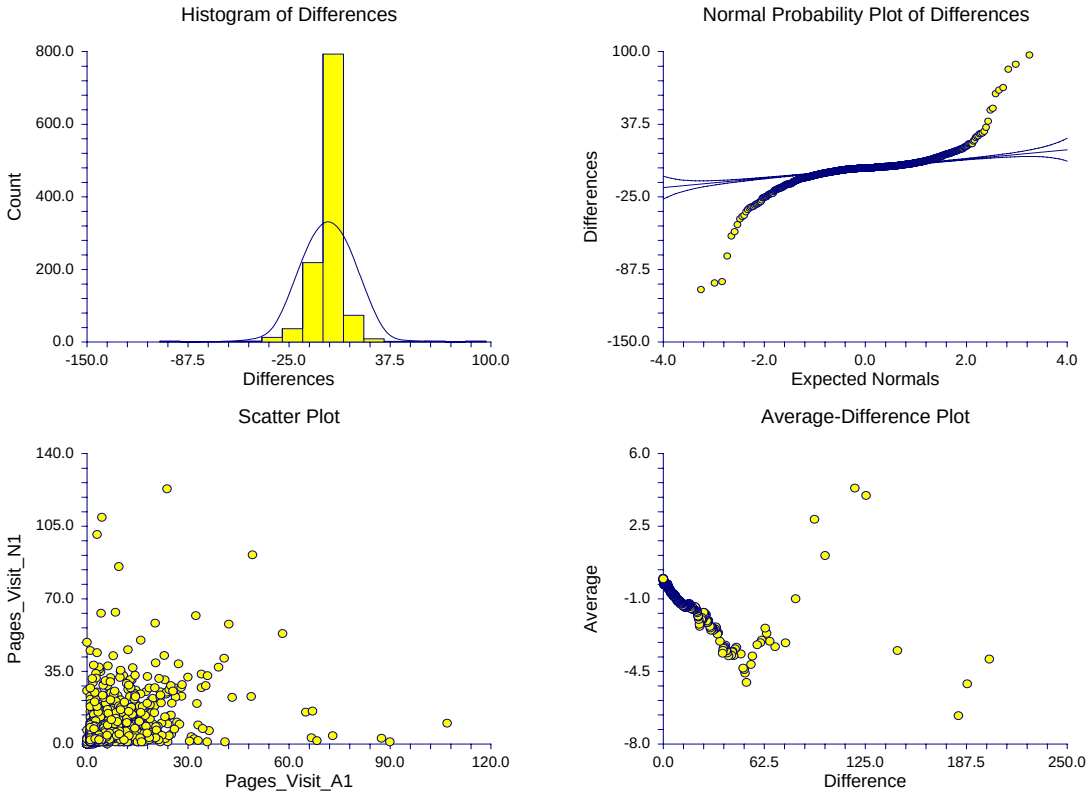
Variable	Count	Mean	Standard Deviation	Standard Error	95.0% LCL of Mean	95.0% UCL of Mean
PV_{off+a}	1164	7.343465	9.407217	0.2757304	6.801733	7.885199
PV_{off-a}	1164	8.3069	10.88035	0.3189088	7.680334	8.933467
Difference	1164	-0.96343	11.98796	0.3513735	-1.653785	-0.2730842

T for Confidence Limits = 1.9647

T-Test For Difference Between Means Section

Alternative Hypothesis	T-Value	Prob Level	Reject H0 at .050	Power (Alpha=.05)	Power (Alpha=.01)
PV_{off+a} - PV_{off-a} <> 0	-2.7419	0.006202	Yes	0.782878	0.565954
PV_{off+a} - PV_{off-a} < 0	-2.7419	0.003101	Yes	0.863692	0.661135
PV_{off+a} - PV_{off-a} > 0	-2.7419	0.996899	No	0.000006	0.000000

Plots Section



A.11 Objective 3.2.b: Statistical Results – PV for Offline Radio Adverts (b)

Paired T-Test Report
Variable X1 = PV_{off+b} , X2 = PV_{off-b}

Descriptive Statistics Section

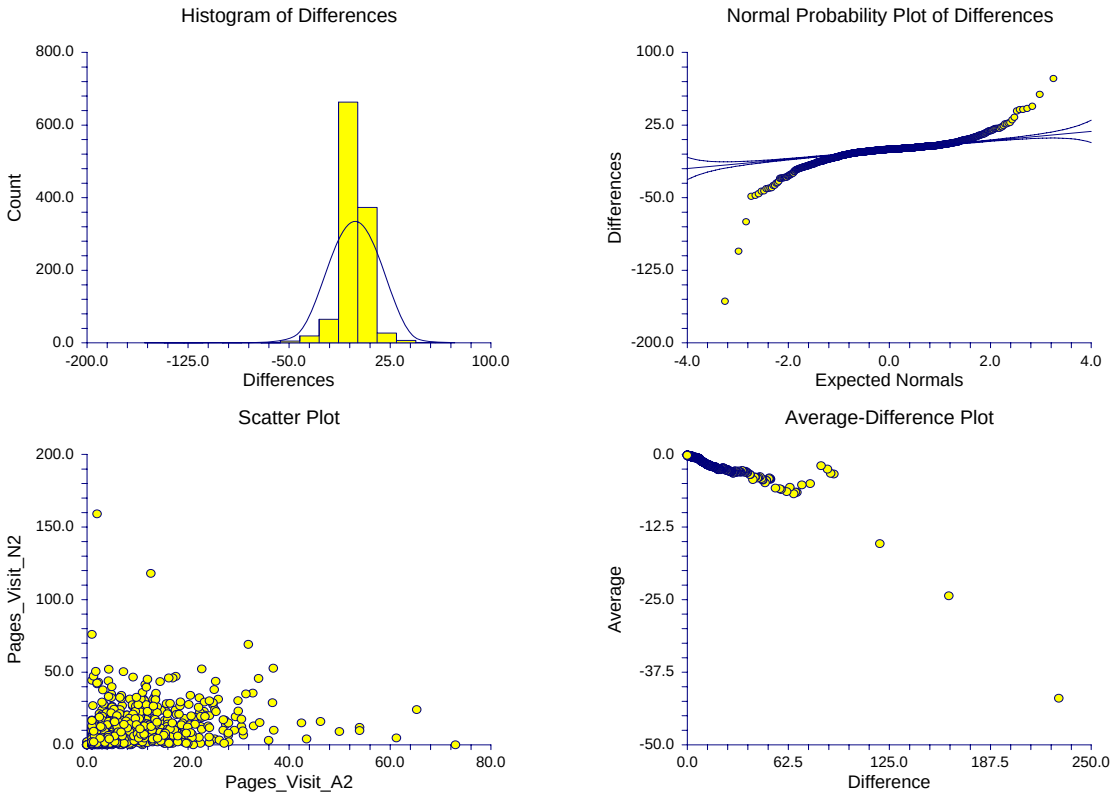
Variable	Count	Mean	Standard Deviation	Standard Error	95.0% LCL of Mean	95.0% UCL of Mean
PV_{off+b}	1164	7.573748	7.7482	0.2271038	7.127553	8.019943
PV_{off-b}	1164	8.962056	10.86519	0.3184645	8.336362	9.587749
Difference	1164	-1.388308	11.38252	0.3336275	-2.043793	-0.7328235

T for Confidence Limits = 1.9647

T-Test For Difference Between Means Section

Alternative Hypothesis	T-Value	Prob Level	Reject H0 at .050	Power (Alpha=.05)	Power (Alpha=.01)
PV_{off+b} - PV_{off-b} <> 0	-4.1613	0.000034	Yes	0.986142	0.943565
PV_{off+b} - PV_{off-b} < 0	-4.1613	0.000017	Yes	0.994072	0.966740
PV_{off+b} - PV_{off-b} > 0	-4.1613	0.999983	No	0.000000	0.000000

Plots Section



A.12 Objective 3.3: Statistical Results – TS for Online Display Adverts

Paired T-Test Report
Variable X1 = TS_{on+} , X2 = TS_{on-}

Descriptive Statistics Section

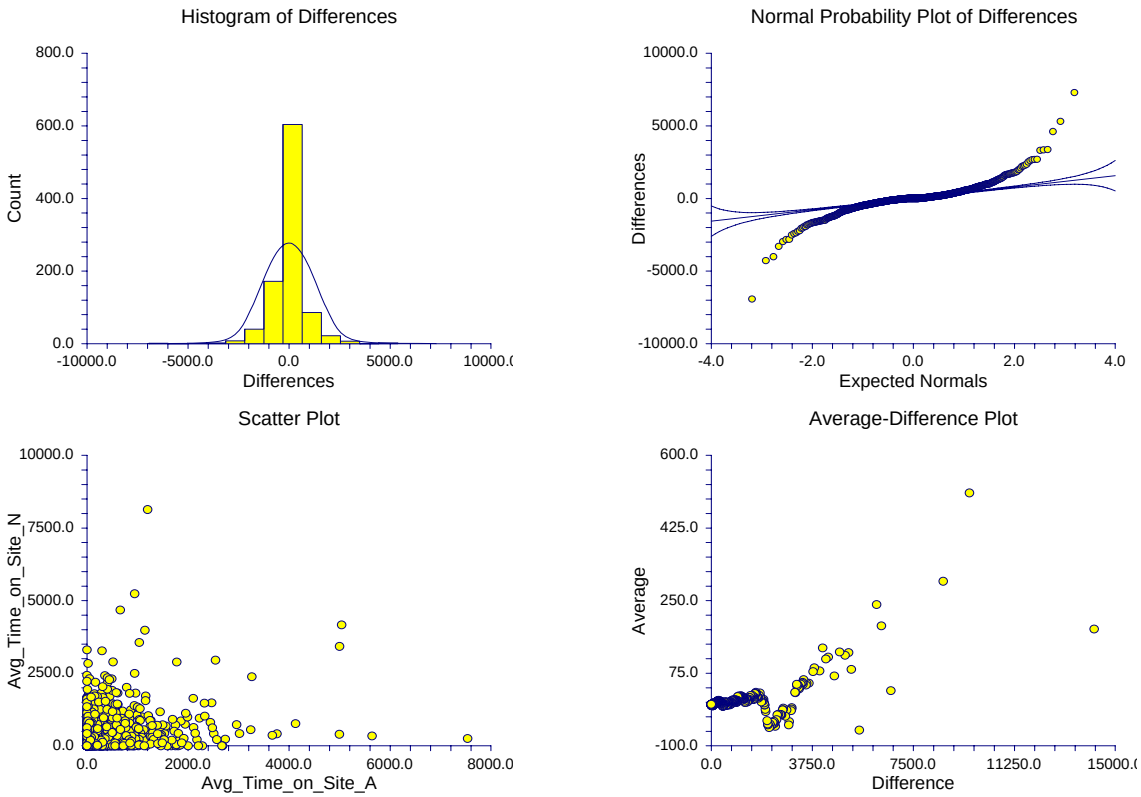
Variable	Count	Mean	Standard Deviation	Standard Error	95.0% LCL of Mean	95.0% UCL of Mean
TS_{on+}	946	451.7469	688.1854	22.37484	407.7866	495.7072
TS_{on-}	946	442.469	652.0724	21.2007	400.8156	484.1225
Difference	946	9.277893	850.2018	27.64245	-45.03177	63.58756

T for Confidence Limits = 1.9647

T-Test For Difference Between Means Section

Alternative Hypothesis	T-Value	Prob Level	Reject H0 at .050	Power (Alpha=.05)	Power (Alpha=.01)
TS_{on+} - TS_{on-} <> 0	0.3356	0.737217	No	0.063003	0.014338
TS_{on+} - TS_{on-} < 0	0.3356	0.631391	No	0.023824	0.003884
TS_{on+} - TS_{on-} > 0	0.3356	0.368609	No	0.095231	0.023256

Plots Section



A.13 Objective 3.4.a: Statistical Results – TS for Offline Radio Adverts (a)

Paired T-Test Report
Variable X1 = TS_{off+a} , X2 = TS_{off-a}

Descriptive Statistics Section

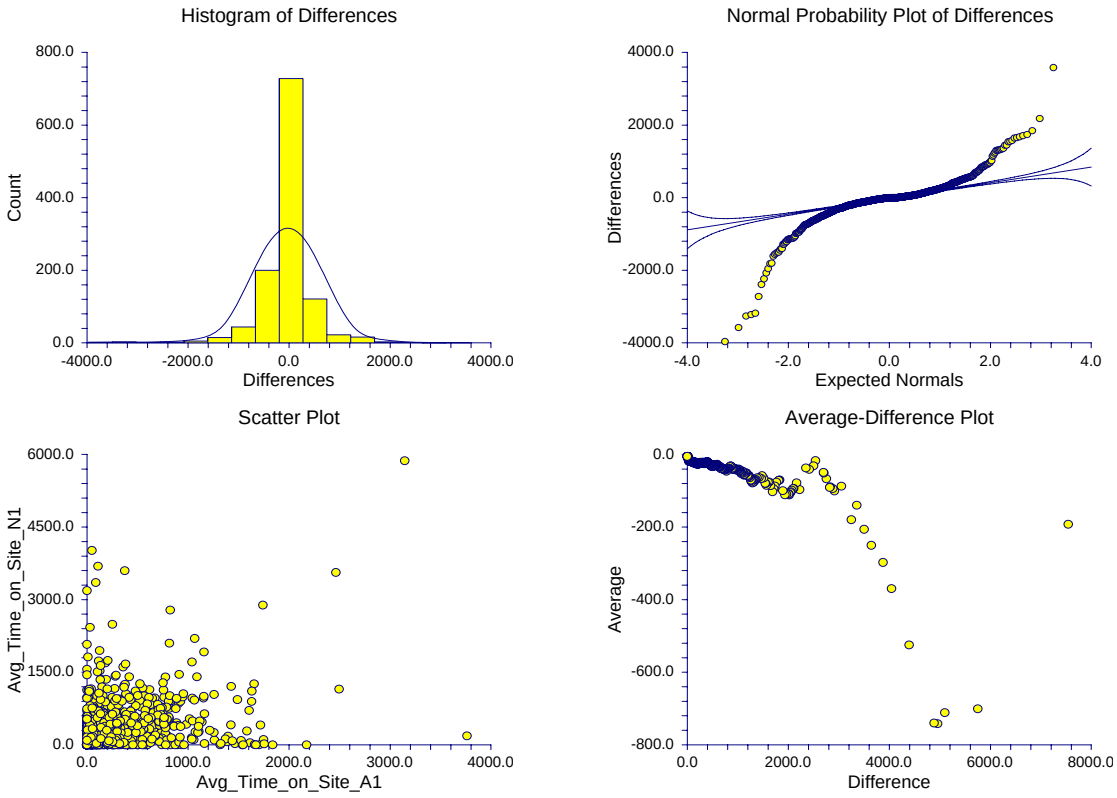
Variable	Count	Mean	Standard Deviation	Standard Error	95.0% LCL of Mean	95.0% UCL of Mean
TS_{off+a}	1164	295.5798	369.5465	10.8316	274.2987	316.8608
TS_{off-a}	1164	334.0568	468.0846	13.7198	307.1012	361.0124
Difference	1164	-38.47704	507.3548	14.87083	-67.69405	-9.260015

T for Confidence Limits = 1.9647

T-Test For Difference Between Means Section

Alternative Hypothesis	T-Value	Prob Level	Reject H0 at .050	Power (Alpha=.05)	Power (Alpha=.01)
TS_{off+a} - TS_{off-a} <> 0	-2.5874	0.009790	Yes	0.734821	0.504623
TS_{off+a} - TS_{off-a} < 0	-2.5874	0.004895	Yes	0.827048	0.602980
TS_{off+a} - TS_{off-a} > 0	-2.5874	0.995105	No	0.000012	0.000000

Plots Section



A.14 Objective 3.4.b: Statistical Results – TS for Offline Radio Adverts (b)

Paired T-Test Report
Variable X1 = TS_{off+b}, X2 = TS_{off-b}

Descriptive Statistics Section

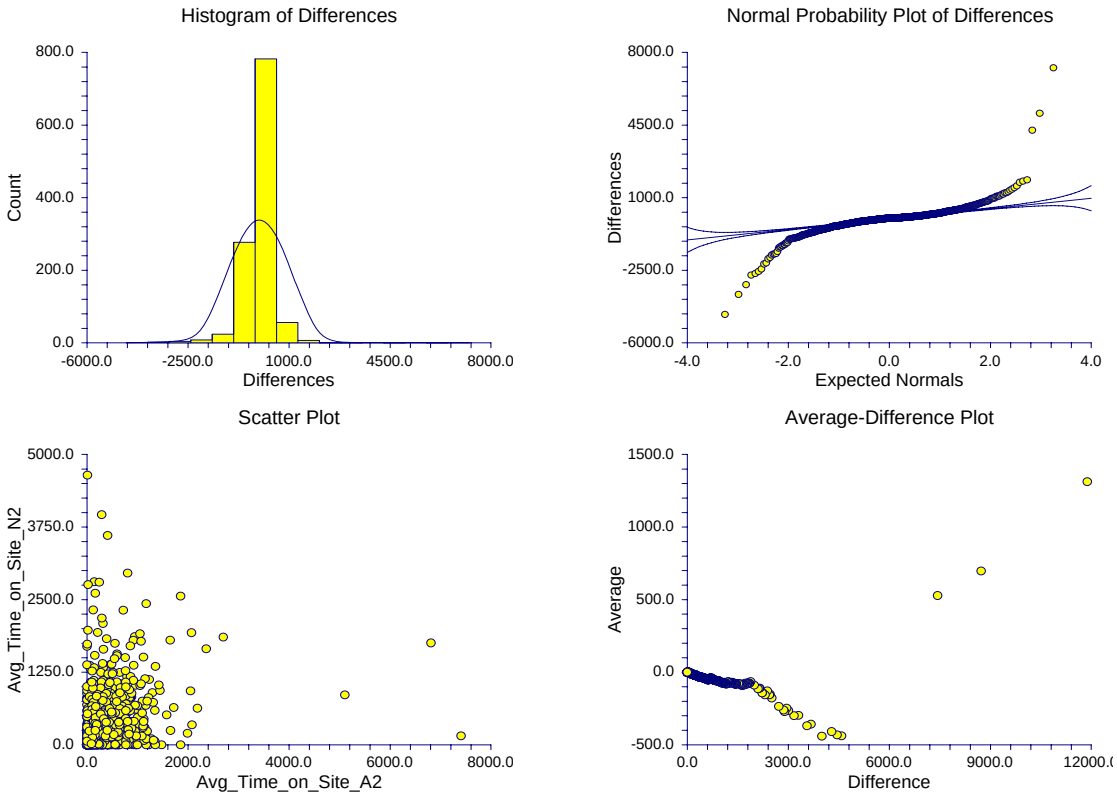
Variable	Count	Mean	Standard Deviation	Standard Error	95.0% LCL of Mean	95.0% UCL of Mean
TS_{off+b}	1164	337.1469	460.1668	13.48773	310.6473	363.6465
TS_{off-b}	1164	372.917	458.0118	13.42456	346.5415	399.2925
Difference	1164	-35.77009	561.8389	16.46779	-68.12469	-3.415496

T for Confidence Limits = 1.9647

T-Test For Difference Between Means Section

Alternative Hypothesis	T-Value	Prob Level	Reject H0 at .050	Power (Alpha=.05)	Power (Alpha=.01)
TS_{off+b} - TS_{off-b} <> 0	-2.1721	0.030048	Yes	0.584027	0.343216
TS_{off+b} - TS_{off-b} < 0	-2.1721	0.015024	Yes	0.700997	0.438717
TS_{off+b} - TS_{off-b} > 0	-2.1721	0.984976	No	0.000068	0.000003

Plots Section



A.15 Objective 3.5: Statistical Results – BR for Online Display Adverts

Paired T-Test Report
Variable X1 = BR_{on+} , X2 = BR_{on-}

Descriptive Statistics Section

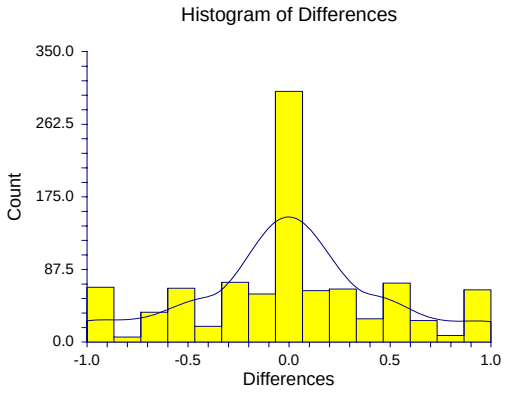
Variable	Count	Mean	Standard Deviation	Standard Error	95.0% LCL of Mean	95.0% UCL of Mean
BR_{on+}	946	0.4036048	0.3894038	1.266061E-02	0.3787303	0.4284794
BR_{on-}	946	0.4056584	0.3799255	1.235245E-02	0.3813893	0.4299275
Difference	946	-2.05357E-03	0.4824749	1.568661E-02	-3.287337E-02	0.0287662

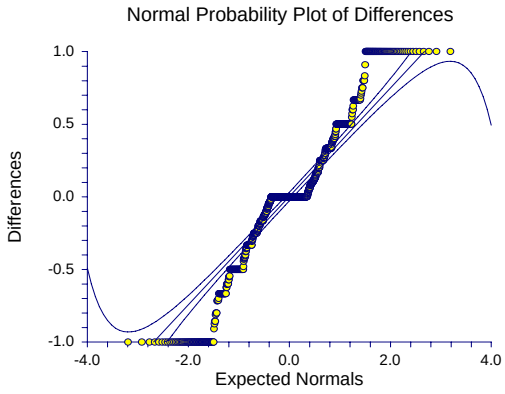
T for Confidence Limits = 1.9647

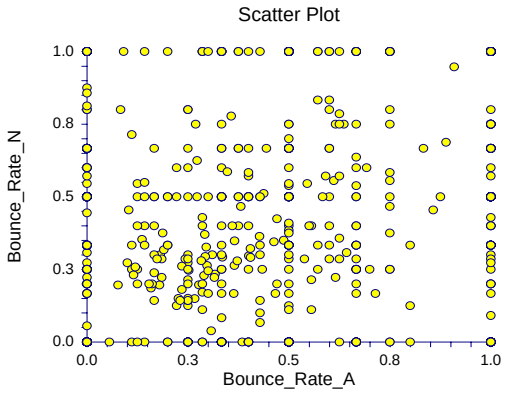
T-Test For Difference Between Means Section

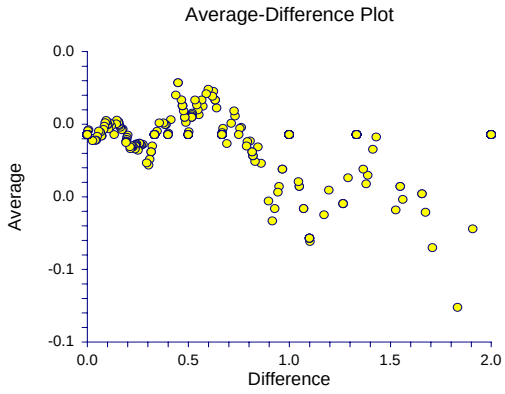
Alternative Hypothesis	T-Value	Prob Level	Reject H0 at .050	Power (Alpha=.05)	Power (Alpha=.01)
BR_{on+} - BR_{on-} < > 0	-0.1309	0.895873	No	0.051966	0.010642
BR_{on+} - BR_{on-} < 0	-0.1309	0.447936	No	0.065020	0.014066
BR_{on+} - BR_{on-} > 0	-0.1309	0.552064	No	0.037886	0.007000

Plots Section









A.16 Objective 3.6.a: Statistical Results – BR for Offline Radio Adverts (a)

Paired T-Test Report
Variable X1 = BR_{off+a} , X2 = BR_{off-a}

Descriptive Statistics Section

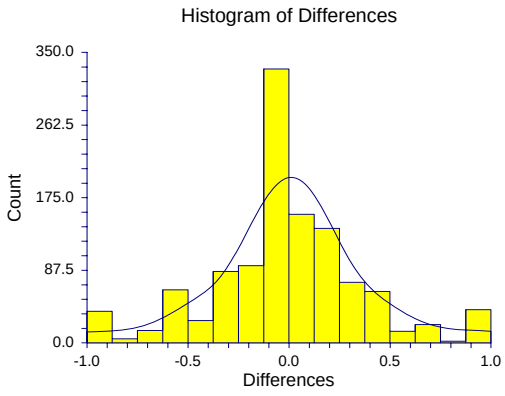
Variable	Count	Mean	Standard Deviation	Standard Error	95.0% LCL of Mean	95.0% UCL of Mean
BR_{off+a}	1164	0.3874972	0.3149697	9.231926E-03	0.369359	0.4056354
BR_{off-a}	1164	0.3821402	0.3074443	9.011352E-03	0.3644355	0.399845
Difference	1164	5.356962E-03	0.376655	1.103995E-02	-1.63334E-02	2.70473E-02

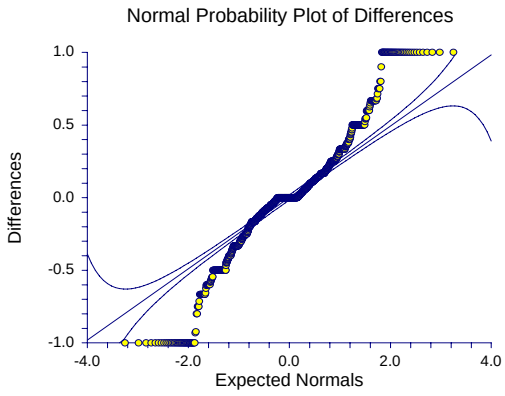
T for Confidence Limits = 1.9647

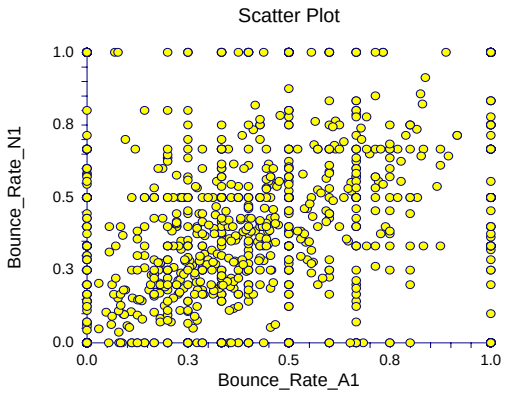
T-Test For Difference Between Means Section

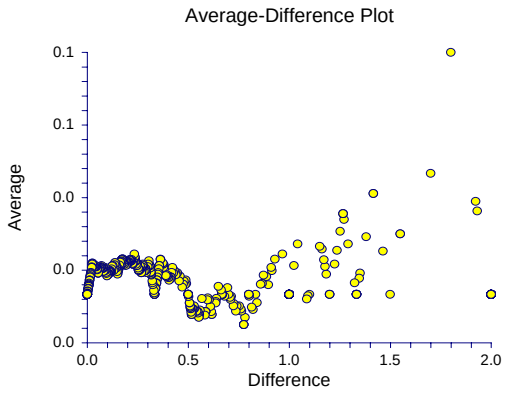
Alternative Hypothesis	T-Value	Prob Level	Reject H0 at .050	Power (Alpha=.05)	Power (Alpha=.01)
BR_{off+a} - BR_{off-a} <> 0	0.4852	0.627602	No	0.077381	0.019385
BR_{off+a} - BR_{off-a} < 0	0.4852	0.686199	No	0.016582	0.002465
BR_{off+a} - BR_{off-a} > 0	0.4852	0.313801	No	0.123102	0.032802

Plots Section









A.17 Objective 3.6.b: Statistical Results – BR for Offline Radio Adverts (b)

Paired T-Test Report
Variable X1 = BR_{off+b} , X2 = BR_{off-b}

Descriptive Statistics Section

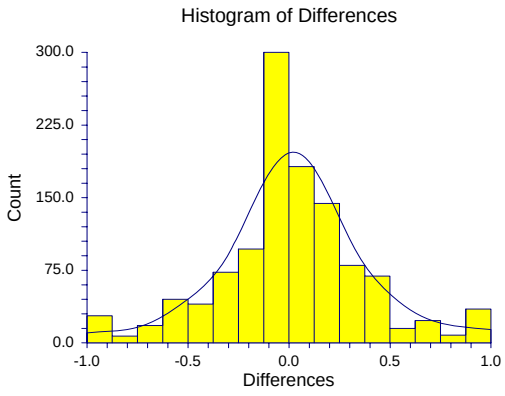
Variable	Count	Mean	Standard Deviation	Standard Error	95.0% LCL of Mean	95.0% UCL of Mean
BR_{off+b}	1164	0.384737	0.2816831	8.256279E-03	0.3685158	0.4009583
BR_{off-b}	1164	0.3603724	0.3035697	8.897785E-03	0.3428907	0.377854
Difference	1164	2.436469E-02	0.3647287	1.069039E-02	3.361074E-03	4.536831E-02

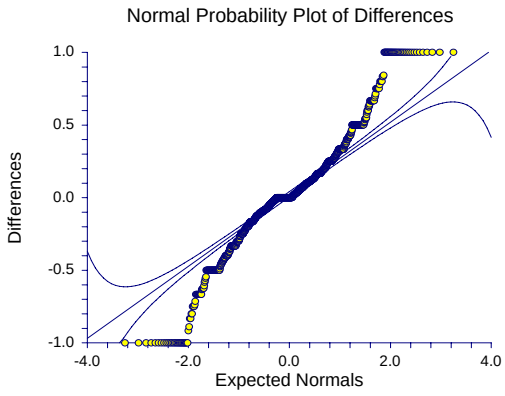
T for Confidence Limits = 1.9647

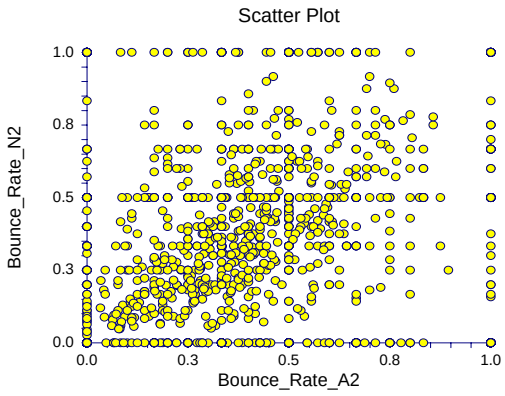
T-Test For Difference Between Means Section

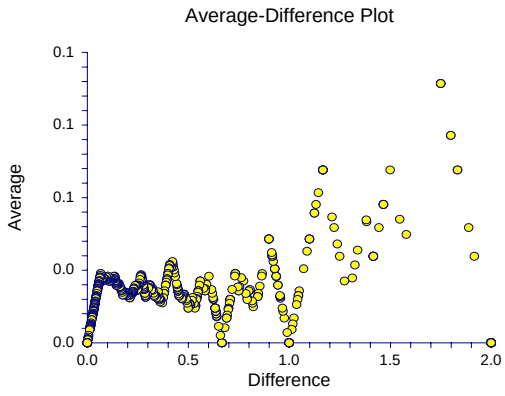
Alternative Hypothesis	T-Value	Prob Level	Reject H0 at .050	Power (Alpha=.05)	Power (Alpha=.01)
BR_{off+b} - BR_{off-b} <> 0	2.2791	0.022840	Yes	0.625208	0.383345
BR_{off+b} - BR_{off-b} < 0	2.2791	0.988580	No	0.000044	0.000002
BR_{off+b} - BR_{off-b} > 0	2.2791	0.011420	Yes	0.737047	0.481166

Plots Section









A.18 Objective 4.1.1: Statistical Results - CPC for Online Display Adverts

Paired T-Test Report

Variable X1 = CPC_{on+}, X2 = CPC_{on-}

Descriptive Statistics Section

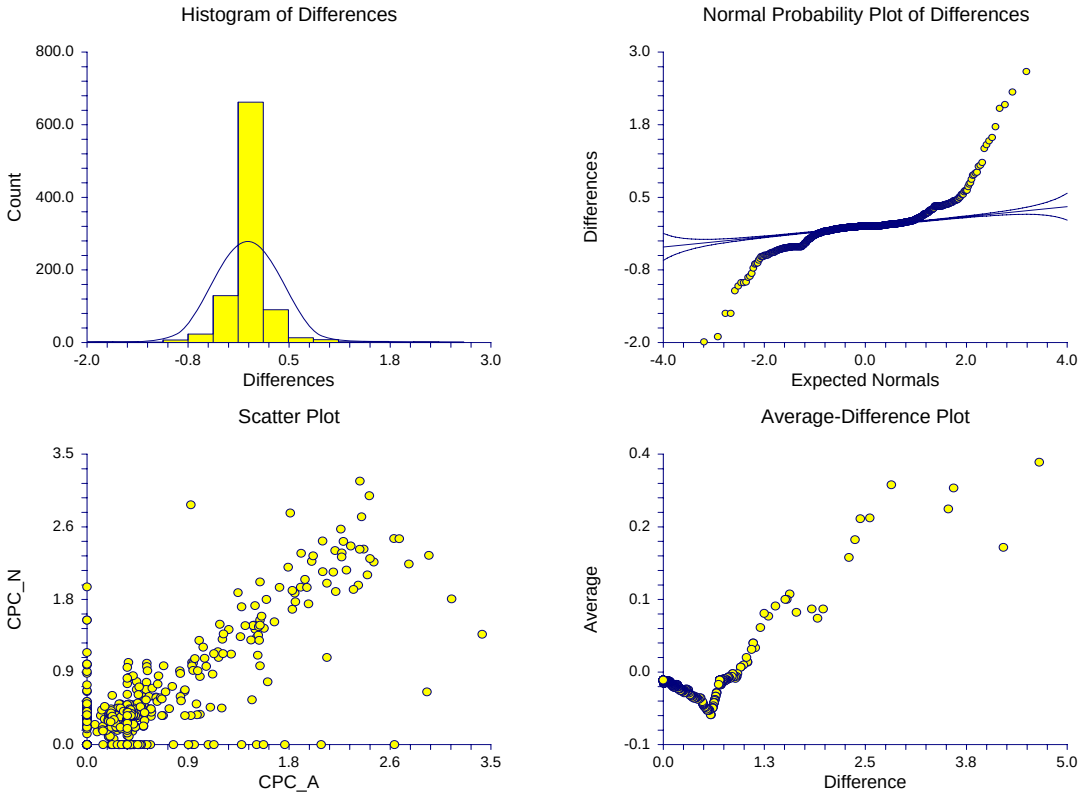
Variable	Count	Mean	Standard Deviation	Standard Error	95.0% LCL of Mean	95.0% UCL of Mean
CPC_{on+}	946	0.4476888	0.5036374	1.637466E-02	0.4155172	0.4798604
CPC_{on-}	946	0.4472573	0.4791347	1.557801E-02	0.4166509	0.4778637
Difference	946	4.314664E-04	0.3151645	1.024688E-02	-1.970079E-02	2.0563E-02

T for Confidence Limits = 1.9647

T-Test For Difference Between Means Section

Alternative Hypothesis	T-Value	Prob Level	Reject H0 at .050	Power (Alpha=.05)	Power (Alpha=.01)
CPC_{on+} - CPC_{on-} <> 0	0.0421	0.966422	No	0.050203	0.010066
CPC_{on+} - CPC_{on-} < 0	0.0421	0.516789	No	0.045805	0.008931
CPC_{on+} - CPC_{on-} > 0	0.0421	0.483211	No	0.054495	0.011179

Plots Section



A.19 Objective 4.2.1.a: Statistical Results - CPC for Offline Radio Adverts (a)

Paired T-Test Report

Variable X1 = CPC_{off+a} , X2 = CPC_{off-a}

Descriptive Statistics Section

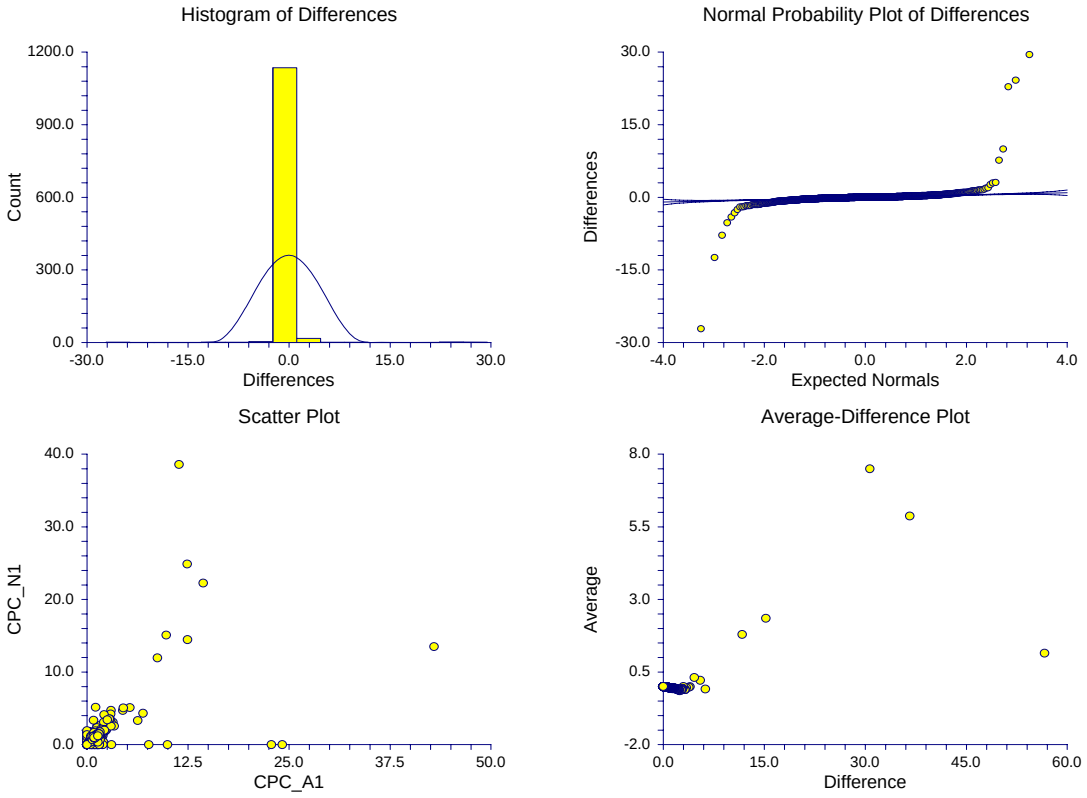
Variable	Count	Mean	Standard Deviation	Standard Error	95.0% LCL of Mean	95.0% UCL of Mean
CPC_{off+a}	1164	1.155105	1.839941	5.392963E-02	1.049148	1.261062
CPC_{off-a}	1164	1.146465	1.728584	5.066568E-02	1.046921	1.246009
Difference	1164	8.639811E-03	1.704771	4.996772E-02	-8.953276E-02	0.1068124

T for Confidence Limits = 1.9647

T-Test For Difference Between Means Section

Alternative Hypothesis	T-Value	Prob Level	Reject H0 at .050	Power (Alpha=.05)	Power (Alpha=.01)
CPC_{off+a} - CPC_{off-a} <> 0	0.1729	0.862754	No	0.053432	0.011124
CPC_{off+a} - CPC_{off-a} < 0	0.1729	0.568623	No	0.034550	0.006223
CPC_{off+a} - CPC_{off-a} > 0	0.1729	0.431377	No	0.070518	0.015642

Plots Section



A.20 Objective 4.2.1.b: Statistical Results - CPC for Offline Radio Adverts (b)

Paired T-Test Report

Variable X1 = CPC_{off+b}, X2 = CPC_{off-b}

Descriptive Statistics Section

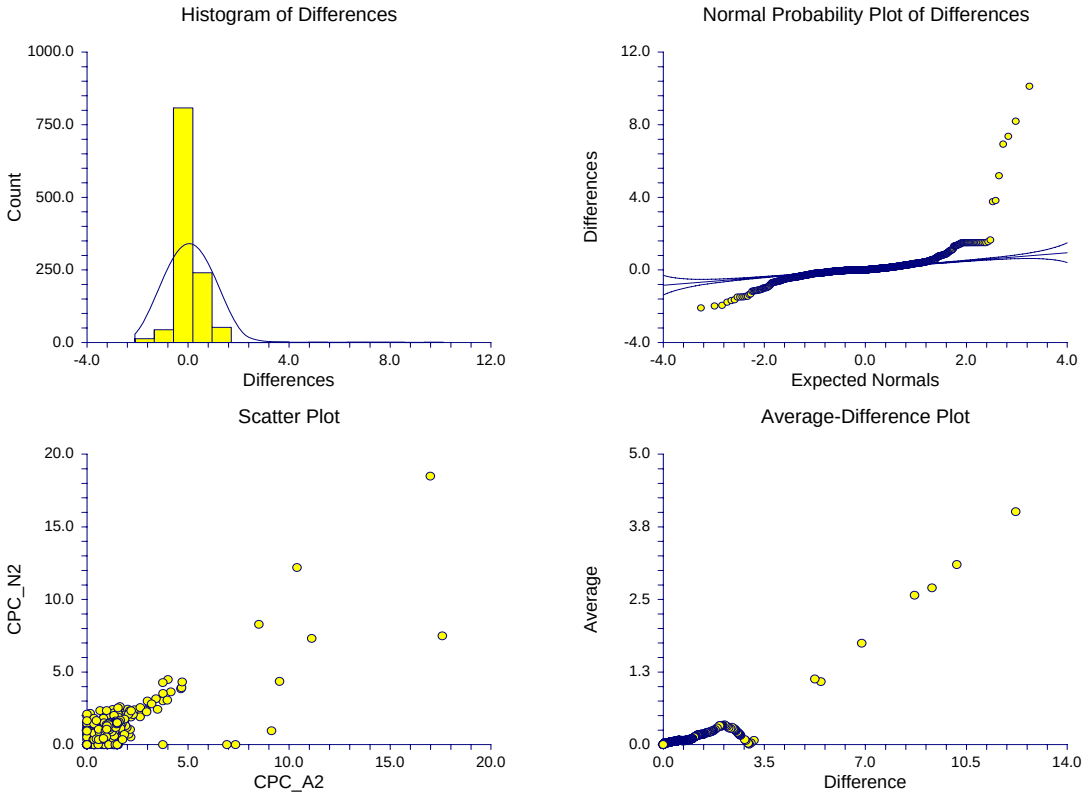
Variable	Count	Mean	Standard Deviation	Standard Error	95.0% LCL of Mean	95.0% UCL of Mean
CPC_{off+b}	1164	1.203412	1.060631	3.108765E-02	1.142334	1.264491
CPC_{off-b}	1164	1.107898	0.9067415	2.657706E-02	1.055681	1.160114
Difference	1164	9.551472E-02	0.6915606	0.02027	5.568985E-02	0.1353396

T for Confidence Limits = 1.9647

T-Test For Difference Between Means Section

Alternative Hypothesis	T-Value	Prob Level	Reject H0 at .050	Power (Alpha=.05)	Power (Alpha=.01)
CPC_{off+b} - CPC_{off-b} <> 0	4.7121	0.000003	Yes	0.997040	0.983672
CPC_{off+b} - CPC_{off-b} < 0	4.7121	0.999999	No	0.000000	0.000000
CPC_{off+b} - CPC_{off-b} > 0	4.7121	0.000001	Yes	0.998920	0.991478

Plots Section



A.21 Objective 4.2.2: Statistical Results - CPC for Offline Television Adverts

Paired T-Test Report

Variable X1 = CPC_{off+} , X2 = CPC_{off-}

Descriptive Statistics Section

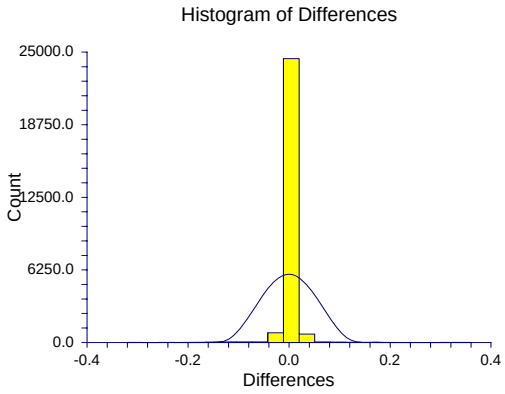
Variable	Count	Mean	Standard Deviation	Standard Error	95.0% LCL of Mean	95.0% UCL of Mean
CPC_{off+}	26281	7.386705E-03	2.386058E-02	1.471838E-04	7.09753E-03	7.6758E-03
CPC_{off-}	26281	7.63974E-03	2.394525E-02	1.477061E-04	7.349539E-03	7.9299E-03
Difference	26281	-2.530345E-04	1.466031E-02	9.043199E-05	-4.30708E-04	-7.536E-05

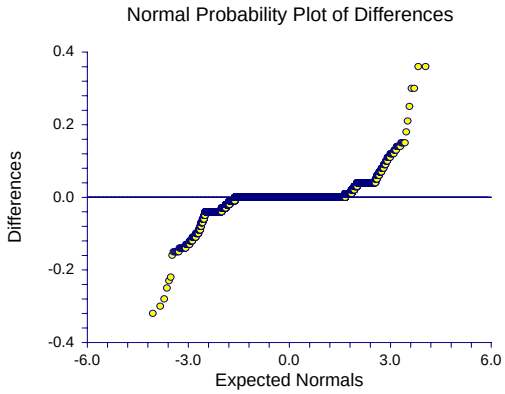
T for Confidence Limits = 1.9647

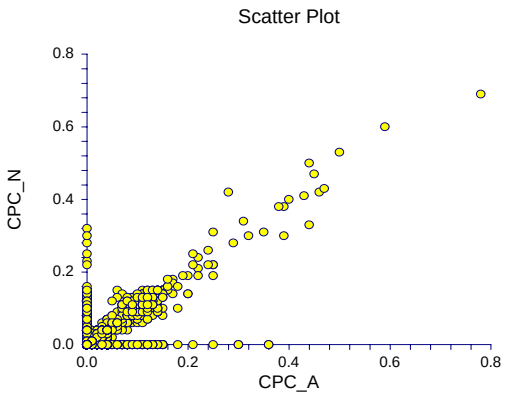
T-Test For Difference Between Means Section

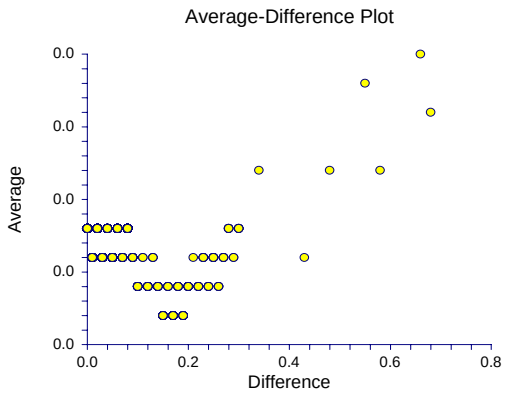
Alternative Hypothesis	T-Value	Prob Level	Reject H0 at .050	Power (Alpha=.05)	Power (Alpha=.01)
CPC_{off+} - CPC_{off-} <> 0	-2.7981	0.005141	Yes	0.799014	0.587935
CPC_{off+} - CPC_{off-} < 0	-2.7981	0.002570	Yes	0.875588	0.681435
CPC_{off+} - CPC_{off-} > 0	-2.7981	0.997430	No	0.000004	0.000000

Plots Section









A.22 Objective 5.1: Statistical Results – New Registrations for Online Display Adverts

Paired T-Test Report
Variable X1 = NR_{on+} , X2 = NR_{on-}

Descriptive Statistics Section

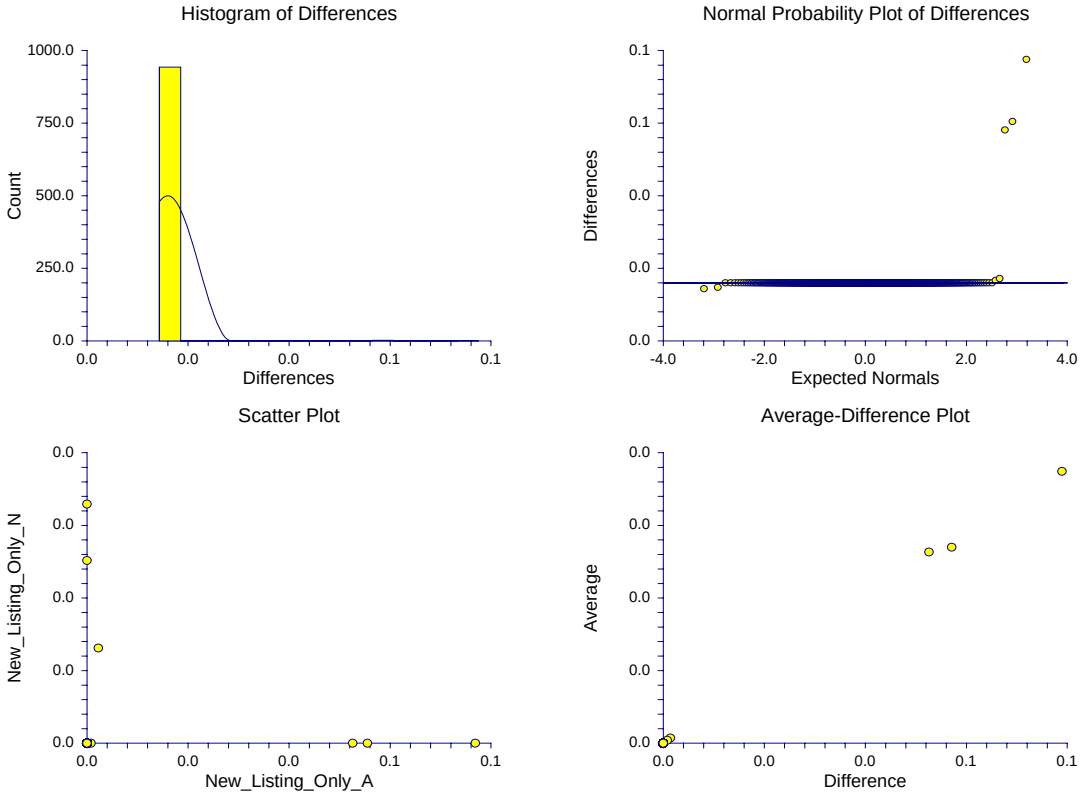
Variable	Count	Mean	Standard Deviation	Standard Error	95.0% LCL of Mean	95.0% UCL of Mean
NR_{on+}	946	1.9890E-04	3.5249E-03	1.1460E-04	-2.6263E-05	4.2407E-04
NR_{on-}	946	4.7028E-06	8.8226E-05	2.8684E-06	-9.3289E-07	1.0338E-05
Difference	946	1.9420E-04	3.5257E-03	1.1463E-04	-3.1018E-05	4.1945E-04

T for Confidence Limits = 1.9647

T-Test For Difference Between Means Section

Alternative Hypothesis	T-Value	Prob Level	Reject H0 at .050	Power (Alpha=.05)	Power (Alpha=.01)
NR_{on+} - NR_{on-} <> 0	1.6941	0.090570	No	0.395313	0.188980
NR_{on+} - NR_{on-} < 0	1.6941	0.954715	No	0.000420	0.000029
NR_{on+} - NR_{on-} > 0	1.6941	0.045285	Yes	0.519651	0.263623

Plots Section



A.23 Objective 5.2.a: Statistical Results – New Registrations for Offline Radio Adverts (a)

Paired T-Test Report
Variable X1 = NR_{off+a} , X2 = NR_{off-a}

Descriptive Statistics Section

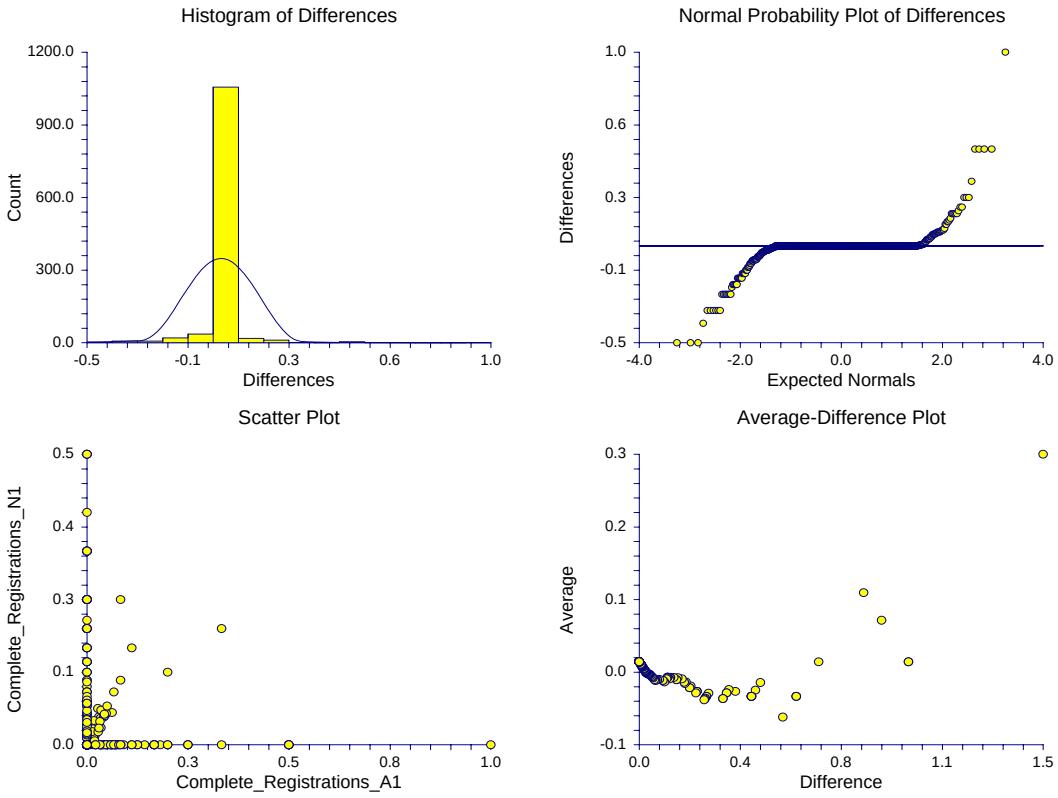
Variable	Count	Mean	Standard Deviation	Standard Error	95.0% LCL of Mean	95.0% UCL of Mean
NR_{off+a}	1164	8.2768E-03	0.0496186	1.4543E-03	5.4194E-03	1.1134E-02
NR_{off-a}	1164	1.1473E-02	4.8853E-02	1.4319E-03	8.6605E-03	1.4287E-02
Difference	1164	-3.1971E-03	6.8788E-02	2.0162E-03	-7.1584E-03	7.6417E-04

T for Confidence Limits = 1.9647

T-Test For Difference Between Means Section

Alternative Hypothesis	T-Value	Prob Level	Reject H0 at .050	Power (Alpha=.05)	Power (Alpha=.01)
NR_{off+a} - NR_{off-a} <> 0	-1.5857	0.113078	No	0.354302	0.161073
NR_{off+a} - NR_{off-a} < 0	-1.5857	0.056539	No	0.476417	0.229455
NR_{off+a} - NR_{off-a} > 0	-1.5857	0.943461	No	0.000618	0.000046

Plots Section



A.24 Objective 5.2.b: Statistical Results – New Registrations for Offline Radio Adverts (b)

Paired T-Test Report
Variable X1 = NR_{off+b} , X2 = NR_{off-b}

Descriptive Statistics Section

Variable	Count	Mean	Standard Deviation	Standard Error	95.0% LCL of Mean	95.0% UCL of Mean
NR_{off+b}	1164	7.5632E-03	3.1763E-02	9.3099E-04	5.7340E-03	9.3923E-03
NR_{off-b}	1164	1.0317E-02	6.1257E-02	1.7955E-03	6.7897E-03	1.3845E-02
Difference	1164	-2.7541E-03	6.8674E-02	2.0128E-03	-6.7088E-03	1.2006E-03

T for Confidence Limits = 1.9647

T-Test For Difference Between Means Section

Alternative Hypothesis	T-Value	Prob Level	Reject H0 at .050	Power (Alpha=.05)	Power (Alpha=.01)
NR_{off+b} - NR_{off-b} <> 0	-1.3683	0.171495	No	0.277461	0.113646
NR_{off+b} - NR_{off-b} < 0	-1.3683	0.085748	No	0.391046	0.169009
NR_{off+b} - NR_{off-b} > 0	-1.3683	0.914252	No	0.001293	0.000110

Plots Section