An analysis of the importance of the long tail in search engine marketing

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ARTICLE INFO

Article history:
Received 1 September 2009
Received in revised form 30 April 2010
Accepted 1 May 2010
Available online 12 May 2010

Keywords:
Long tail
Search engine marketing
Online marketing

ABSTRACT

Search engine marketing is currently the most popular form of online advertising. Many advertising agencies and bloggers claim that the success of search engine marketing is driven by the “long tail”, defined in this research as the many less popular keywords employed by users to search the Internet, and suggest that search engine marketing campaigns need to have hundreds or thousands of keywords to accommodate this phenomenon. We doubt this claim. Our data from three search engine marketing campaigns in two countries, which report the success of a total of 4908 keywords over 36 weeks, covering 10,104,015 searches and 492,735 clicks, show that the top 20% of all keywords attract on average 98.16% of all searches and generate 97.21% of all clicks. The use of the top 100 keywords in each campaign attracts on average 88.57% of all searches and 81.40% of all clicks. These results are fairly stable across a varying total number of keywords in use and suggest that the success of search engine marketing is driven by relatively few keywords. However, we also show that the set of the top 100 keywords changes over time. Hence, advertisers need to concentrate on finding the top 100 keywords, but they do not need to bother too much about the performance of keywords in the long tail.

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1. Introduction

The market for search engine marketing continues to grow steadily throughout the world. Expenditures on search engine marketing in 2009 were $10.7 billion in the US alone and thus account for 7% of the total online advertising spending in the US (IAB 2010). Hence, search engine marketing is currently the most popular form of online advertising. It allows advertisers to place text ads that depend on the keywords entered in a search engine. These ads are linked to advertisers’ websites, which hold further information related to the entered search keywords.

In Fig. 1, for example, the user entered the search keywords “two-way radios” into Google's search engine. The user receives then two different results from the search engine provider: the lower, left-hand part of the screen shows the unsponsored, organic search results, whose ranking is driven by the relevance that the search algorithm assigns to these results. The other parts on the top and the right side of the list present ads known as sponsored search results. The display of the unsponsored search results is free of charge, whereas advertisers pay for each click on their ads in the sponsored search results. The ranking of these ads is the result of keyword auctions for which the advertisers need to submit bids for the price per click that they are willing to pay. For more details on keyword auctions, which also uses weights to reflect differences in the quality of the ads, see Edelman et al. (2006) or Varian (2006). In the example of Fig. 1, ads ranked 1 and 2 are above the unsponsored search results, and the ads ranked 3–7 are on the right side of the search results. Generally, the leading ranks draw the most attention of the users and are therefore most preferable, and thus these ranks are sold to the bidder with the highest (weighted) bid. Hence, higher bids lead to higher and thus more attractive ranks, more awareness, more clicks and hence very likely to a higher number of acquired customers (Hotchkiss et al. 2005). However, the prices per click on those ranks are also higher, which leads to higher acquisition costs per customer.

The number of keywords that advertisers might use is rather unlimited, and it is tempting to presume that the long tail, defined in this research as the many keywords that are available for search on the Internet, is also fairly important in search engine marketing. Anderson (2006) coined the phrase to describe the phenomenon that niche products can gain a significant share in total sales. In line with this idea, online advertising agencies and bloggers now also claim that search engine marketing campaigns need to have hundreds or thousands of keywords because the long tail, that is, the many less popular keywords, drives success in search engine marketing.

The primary motivation of this research is that we doubt the importance of the long tail in search engine marketing. Thus, we believe that the set of keywords required to successfully run search engine marketing campaigns can be fairly small so that the management of search engine marketing campaigns is easier than
many online advertising agencies claim. Therefore, the aim of this paper is to examine the importance of the long tail in search engine marketing. Stated differently, we would like to study whether the use of many different keywords drives the success in search engine marketing or whether this success is driven by a few but important keywords. To accomplish this, the remainder of this paper is organized as follows. Section 2 provides an overview about search engine marketing and Section 3 discusses the idea of the long tail phenomenon and its relevance for search engine marketing. Section 4 describes the set-up of the empirical studies and Section 5 presents their results. We conclude in Section 6 with a summary of our findings.

2. Search engine marketing: an overview

Search engine marketing is by far the largest source of revenue for Google (Edelman et al. 2006), which is the market leader of search engine providers in most Western countries, usually clearly ahead of Yahoo and Microsoft (Ghose and Yang 2009). The display of the unsponsored (organic) search results is free of charge, whereas advertisers pay for each click on their ads that appear among the sponsored (paid) search results. Typically, the term “search engine optimization” labels efforts of firms that aim to improve the ranking of the ad in the unsponsored search results and the term “search engine marketing” describes efforts towards optimizing the placement of ads in the sponsored search results. These efforts together account nowadays for approximately 50% of all online advertising expenditures (IAB 2010). The main reason for this very high share is that search engines have become the main tool consumers use to locate information (Rangaswamy et al. 2009). Despite this huge importance for firms, research on search engine marketing is still limited, which is not too surprising as this kind of advertising is rather new. It was introduced in 1997 by GoTo, which was acquired by Overture and is now part of Yahoo (Edelman et al. 2006). Surprisingly, Yahoo allowed Google to use their proprietary pricing mechanism, which is patented under US law.

Basically two streams of research on search engine marketing exist. One stream deals with the optimal design of keyword auctions and possible improvements (Chen et al. 2009, Edelman et al. 2006, Feng 2008, Liu et al. in press, Varian 2006) or examines bidding behavior in keyword auctions (Edelman and Ostrovsky 2007). Other studies analyze the effect of click fraud on the search engine provider’s revenue (Wilbur and Zhu 2009, Midha 2008). Mahdian and Tomak (2008) comment on the challenges of designing mechanisms for pay-per-action instead of pay-per-click models. These studies have great relevance, though primarily for search engine providers.

Another research stream analyzes key questions from the advertisers’ perspective, including forecasts of the success of single keywords by modeling the relationships between bid and rank as well as rank and click-through rate (Kitts and LeBlanc 2004, Feng et al. 2007, Ghose and Yang 2009), the interdependencies among keywords (Rutz and Bucklin in press) or between organic and sponsored search (Yang and Ghose in press). He and Chen (2006) investigate the impact of ad ranks on the quality signal perceived by uninformed consumers. These studies primarily provide recommendation for advertisers to better bid in keyword auctions.

3. Long tail and search engine marketing

The phrase “long tail” became popular with the best-selling book of Anderson (2006) and, more generally, describes the phenomenon that the distribution of demand across products has shifted away from blockbuster products to niche products. This idea builds upon work by Brynjolfsson et al. (2003), who show that a large proportion of book sales come from books that are not frequently purchased. There is an under-exploited spectrum of customers’ tastes to which pre-Internet retailers could not cost-effectively cater (Tucker and Zhang 2007). The existence of the long tail phenomenon is also supported by studies of Brynjolfsson et al. (2007) and Elberse and Obergolzer-Gee (2006). Although Elberse (2008) and Fleder and Hosanagar (2009) did not observe such a shift, the popularity of long tail-thinking among practicing managers is very high (see, e.g., Enge’s comments at searchengine-watch.com/3635039).

In line with these ideas, online advertising agencies and bloggers postulate that search engine marketing campaigns need to have hundreds or thousands of keywords because a large number
of rather less popular keywords drives the success in search engine marketing (see, e.g., www.davechaffey.com/blog/seo/new-keyword-research-tool/; www.searchengineguide.com/matt-bailley/keyword-strategies-the-long-tail.php; and www.seomoz.org/blog/illustrating-the-long-tail). The implication of the potential importance of the long tail in search engine marketing is that the management of search engine marketing campaigns is rather cumbersome because advertisers need to administer many keywords and optimize their prices and texts. A likely consequence is that advertisers are reluctant to run search engine marketing campaigns themselves and instead hire online advertising agencies to do so. Advertisers might thus perceive management of a search engine marketing campaign as rather complicated. Additionally, it might be an argument to extend search engine marketing campaigns even if “short tail” search engine marketing campaigns are not profitable, which might also be driven by the rather high prices that have to be paid at search engines such as Google. Lilienthal and Skiera (2010), for example, document an average price per click on an ad of rank 1 of $2.44 and outline that clicks on top ranks in the finance and insurance industry can cost up to $16.37 in the United States and $6.30 in Germany. Such prices, in combination with low conversion rates, make search engine marketing quickly unprofitable for advertisers.

We doubt that the long tail, based on the large number of rather less popular keywords, drives the success of search engine marketing campaigns. We therefore empirically analyze the following three propositions:

1. **Proposition 1 (the concentration proposition):** The distribution of searches, clicks and conversions across keywords is concentrated.

2. **Proposition 2 (the increasing keywords proposition):** An increase in the number of keywords has a rather small effect on the number of searches, clicks and conversions.

3. **Proposition 3 (the most popular keyword proposition):** The use of the most popular keywords at one point in time is sufficient to capture the vast majority of searches, clicks and conversions in future periods.

Such knowledge is important because support for these propositions could encourage advertisers to run search engine marketing campaigns by themselves or to concentrate their supervision to the most popular keywords. Additionally, it would be a clear signal for top management that running and managing such campaigns is not too complicated and good results might be achieved by focusing on the most popular keywords. The optimal number of keywords certainly depends on the costs that are associated with the administration of each keyword. These costs might vary substantially across advertisers and depend on the size of the administration costs (which might be reduced if bid management software is used), the structure of the administration costs (fixed or variable) and the opportunity to allocate the administration costs to the number of clicks of keywords. Higher and more variable administration costs certainly lead to situations in which it is more attractive to focus on rather few keywords while the optimal number of managed keywords is certainly higher if variable costs are low. A detailed analysis requires detailed information about administration costs, which is beyond the aim of this study but seems to be an interesting avenue for further research.

4. **Description of empirical studies**

We used data of search engine marketing campaigns from three firms of two European countries (Germany and Spain) that cover 36 weeks from August 2007 to April 2008 in two different industries. The first campaign, “Travel 1”, was conducted in Germany and aimed at selling boating vacations. The second campaign, “Industrial Goods”, was run in Spain and used ads to draw interest for industrial goods such as industrial weights. A third campaign, “Travel 2”, was carried out in Germany and was intended to sell cruises. As other studies have (Ghose and Yang 2009, Rutz and Bucklin in press, Yang and Ghose in press), we rely on data that were provided by these firms. We recognize that they might not be representative of the search engine marketing campaigns of other firms. Yet, in contrast to many other studies, we provide results for more than one firm and more than one country. Table 1 provides descriptive information about these three search engine marketing campaigns.

All campaigns used a large number of different keywords, which varied between 1206 keywords for “Industrial Goods” and 2018 for the “Travel 1” campaign. On average, the keywords of two campaigns were displayed on fairly well-ranked positions (1.36 and 1.12), whereas those of the third campaign were shown on less attractive ranks (3.71). The total number of searches for campaign “Travel 1” was 1826,536. Divided by the number of keywords (2018), this yields an average number of searches per key-word of 905.12. The division of the total number of clicks (89,846) by the number of keywords (2018) leads to an average number of clicks per keyword of 44.52. The click-through-rate (CTR) is the share of clicks at the number of searches, thus the total number of clicks (89,846) divided by the total number of searches (1,826,534). When searchers click on one of these ads, they are directed to the advertisers’ landing page, which usually provides the possibility to act. In this context, the general term “action” comprises either a lead, to which registrations and downloads are assigned, or an order. The term “conversion” is frequently used to indicate either leads or orders and in our three empirical studies all conversions reflect orders and thus actual purchase transactions. The conversion rate (CR) describes the percentage of clicks on an ad that finally leads to a conversion, which is in case of campaign “Travel 1” 7.10% (6379 conversions divided by 89,846 clicks).

5. **Results of empirical studies**

5.1. **Distribution of searches and clicks across keywords**

In line with previous research on the long tail (e.g., Brynjolfsson et al. 2003, 2007, Ghose and Gu 2006, Hervas-Drane 2007), we use different measures to assess our Proposition 1, based on the concentration of searches and clicks across keywords. In particular, we calculate the share of the top 20% and top 100 keywords in the total number of searches, the total number of clicks, and the Gini coefficient. Table 2 provides the results for each of the three search engine marketing campaigns.

<table>
<thead>
<tr>
<th>Table 1</th>
<th>Description of three search engine marketing campaigns.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Travel 1</td>
</tr>
<tr>
<td>Number of keywords</td>
<td>2018</td>
</tr>
<tr>
<td>Average rank</td>
<td>1.36</td>
</tr>
<tr>
<td>Total number of searches</td>
<td>1,826,534</td>
</tr>
<tr>
<td>Average number of searches per keyword</td>
<td>905.12</td>
</tr>
<tr>
<td>Total number of clicks</td>
<td>89,846</td>
</tr>
<tr>
<td>Average number of clicks per keyword</td>
<td>44.52</td>
</tr>
<tr>
<td>Average click-through-rate (CTR) (%)</td>
<td>4.91</td>
</tr>
<tr>
<td>Average conversion rate (CR) (%)</td>
<td>7.10</td>
</tr>
<tr>
<td>Total number of conversions</td>
<td>6379</td>
</tr>
<tr>
<td>Average number of conversions</td>
<td>3.16</td>
</tr>
</tbody>
</table>
campaigns. We also report the corresponding share of conversions for the top 20% and top 100 keywords. The top 20% keywords on average represent 98.16% of all searches and 94.32% of all conversions. The top 100 keywords cover 88.57% of all searches and 79.45% of all conversions. The Gini coefficient can range from 0 to 1, and values close to 1 indicate a high concentration. The average value of 0.9496 for the Gini coefficient also points out that most searches concentrate on rather few keywords.

Analysis of the concentration of clicks yields similar results: the top 20% keywords generate on average 97.21% of all clicks and 96.58% of all conversions. The top 100 keywords cover 81.40% of all searches and 82.48% of all conversions. The average Gini coefficient of 0.9266 also indicates that clicks are concentrated in a few keywords. Interestingly, from comparing the concentration measures for searches with those for clicks, all measures indicate a lower concentration for clicks. Still, we find strong support for our Proposition 1.

5.2. Effects of an increase in the number of keywords

Our results so far have shown that the top 100 keywords of the three campaigns, with a total of 10,104,015 searches, 492,735 clicks and 4908 keywords, generate on average 88.57% of all searches and 81.40% of all clicks as well as the vast majority of all conversions. While those results show that rather few keywords are responsible for a very large share of all searches, clicks and conversions, they do not reveal the effects of an increasing number of keywords (Proposition 2). Therefore, we next analyze the effect of an increasing number of keywords on the share of the top 100 keywords in the total number of searches and clicks. We thus rank all keywords according to their weekly volume of searches and clicks. We then select the top 100 keywords (i.e., the keywords that rank between 1 and 100 with regard to the number of searches and clicks) and calculate their share of the weekly number of all searches and clicks. We also determine the number of keywords used for every week. Fig. 2 illustrates the development of the weekly share of the top 100 keywords in the total number of searches, clicks and keywords over time. Fig. 2 also illustrates that the number of keywords varies between 340 and 750 keywords per week.

Table 2
Concentration of searches and clicks across keywords.

<table>
<thead>
<tr>
<th>Campaign</th>
<th>Top 20 (%)</th>
<th>Top 100 (%)</th>
<th>Gini coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concentration of searches</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Travel 1</td>
<td>98.57 (91.32*)</td>
<td>86.24 (68.36*)</td>
<td>0.9521</td>
</tr>
<tr>
<td>Industrial goods</td>
<td>97.05 (92.83*)</td>
<td>88.71 (73.86*)</td>
<td>0.9325</td>
</tr>
<tr>
<td>Travel 2</td>
<td>98.85 (98.82*)</td>
<td>90.75 (81.29*)</td>
<td>0.9641</td>
</tr>
<tr>
<td>Average over all campaigns</td>
<td>98.16 (94.32*)</td>
<td>88.57 (79.45*)</td>
<td>0.9496</td>
</tr>
<tr>
<td>Concentration of clicks</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Travel 1</td>
<td>96.91 (95.84*)</td>
<td>75.68 (79.65*)</td>
<td>0.9181</td>
</tr>
<tr>
<td>Industrial goods</td>
<td>97.11 (94.69*)</td>
<td>87.58 (79.03*)</td>
<td>0.9307</td>
</tr>
<tr>
<td>Travel 2</td>
<td>97.60 (99.21*)</td>
<td>80.95 (88.75*)</td>
<td>0.9309</td>
</tr>
<tr>
<td>Average over all campaigns</td>
<td>97.21 (96.58*)</td>
<td>81.40 (82.48*)</td>
<td>0.9266</td>
</tr>
</tbody>
</table>

* Corresponding share of conversions.

Fig. 2. Development of the weekly share of the top 100 keywords in the total number of searches, clicks and keywords over time.
Fig. 2 indicates a negative correlation between the number of keywords and the share of the top 100 keywords for all campaigns (with the exception of the weekly share of top 100 keywords among the total number of searches for the campaign “Industrial Goods”). This result is in line with our expectation that the share of the top 100 keywords would decrease with the number of keywords.

We estimate an aggregate logit model to further determine the influence of the number of keywords on the weekly share of top 100 keywords in the number of searches and clicks. Eq. (1) illustrates the general structure of our model, while Eq. (2) shows the model specification.

$$S_{100,c.t} = \frac{e^{\nu_{c,t}}}{1 + e^{\nu_{c,t}}}$$  \hspace{1cm} (1)

with $S_{100,c.t}$ is the share of the top 100 keywords among the total number of searches and clicks for campaign $c$ in week $t$; and $\nu_{c,t}$ the function parameter of the share of the top 100 keywords in searches (clicks) for campaign $c$ in week $t$:

$$\nu_{c,t} = \beta_{c,0} + \beta_{c,1} \cdot n_{c,t} + \beta_{c,2} \cdot n_{c,t}^2 + \epsilon_{c,t}$$  \hspace{1cm} (2)

with $\beta_{c,0}$, $\beta_{c,1}$, $\beta_{c,2}$ are the function parameters for campaign $c$; $n_{c,t}$ total number of keywords for campaign $c$ in week $t$; $\epsilon_{c,t}$ residual in week $t$ for campaign $c$; $t$, index set of weeks; and $c$, the index set of campaigns. We estimate our model via ordinary least squares regression by taking the logs of our model according to Eq. (3):

$$\ln \left( \frac{S_{100,c.t}}{1 - S_{100,c.t}} \right) = \nu_{c,t} = \beta_{c,0} + \beta_{c,1} \cdot n_{c,t} + \beta_{c,2} \cdot n_{c,t}^2 + \epsilon_{c,t}$$  \hspace{1cm} (3)

Table 3 reports the results of the estimation, which indicate that all parameters are highly significant for all campaigns. The $R^2$ shows that the explained variance is substantially higher for the two travel campaigns compared to the campaign for industrial goods. As already pointed out in Fig. 2 there is some unexpected positive correlation between the weekly share of top 100 keywords and the total number of searches and we expect some exogenous effects that are not captured in the available data and that account for the low explained variance.

The negative value for parameter $\beta_{c,1}$ indicates that the share of top 100 keywords in the total number of searches (clicks) declines with an increase in the number of keywords but does so at a decreasing rate (see the positive value of parameter $\beta_{c,2}$). Fig. 3 illustrates these results graphically for different numbers of keywords for each campaign, which vary between the minimum and the maximum number of keywords that are used in their respective campaigns (see Fig. 2).

![Fig. 3](image-url)
Fig. 3 illustrates that the share of the top 100 keywords in the total number of searches and clicks is fairly stable across the different numbers of keywords. Even though we detect a decreasing share of top 100 keywords with an increasing number of keywords, this decrease is diminishing and converges to zero at about 650 keywords in use for campaigns “Travel 1” and “Travel 2” and at about 550 for the campaign “Industrial Goods”. The share of the top 100 keywords in the total number of searches and clicks for the campaign “Industrial Goods” stays approximately at 90%. For the campaigns “Travel 1” and “Travel 2”, the share of total clicks decreases to about 80% for a large number of keywords, and the share of total searches does not drop below 90%. Our findings imply that an increase in the number of keywords leads to only slightly more searches and clicks. Interestingly, for two of the three campaigns, the share of the top 100 keywords in the total number of searches decreases more strongly with the number of keywords than does their share of the total number of clicks.

The results in Fig. 3 illustrate that the top-performing keywords generate the majority of searches and clicks and that this result is fairly stable between different numbers of keywords. Our results support Proposition 2 and contradict the assumed importance of the long tail in search engine marketing, which claims the necessity of having many less popular keywords in use for successful search engine campaigns.

5.3. Prediction of the success of short-tailed strategies

Our results so far suggest that the use of few keywords is sufficient to capture the vast majority of searches, clicks and conversions. Yet, these are ex post results, meaning that we first observed the success of all keywords and then determined the share of the best keywords in this success. In reality, firms need to first decide on the set of keywords they use; they are then able to observe the success of these keywords. Therefore, we also test Proposition 3 and conduct an ex-ante analysis in which we use the first 10 weeks of our observation period to select the top 100 keywords and then determine their share of searches, clicks and conversions during the following weeks. We also illustrate the respective effect of changes in the number of keywords and differences in the composition of the set of the top 100 keywords.
Table 4 shows that the top 100 keywords of the first 10 weeks generate the vast majority of searches, clicks and conversions in the following weeks but that they do so at a declining rate. For example, the top 100 keywords of the “Travel 1” campaign generate 91.59% of searches, 74.61% of clicks and 81.01% of conversions in Week 15, but their share declines to 52.81% of searches, 46.47% of clicks and 52.77% of conversions in Week 35. Even though the remaining two campaigns show a more stable share of the top 100 keywords, this share is also declining. The column “Still in Use” in Table 4 indicates that the firm stopped using 23% of the remaining two campaigns show a more stable share of the top 100 keywords. This might explain why the shares dropped more steeply in this campaign than in the other two campaigns. Table 4 also shows that there is not a clear trend in how new keywords or former bottom keywords, which were not part of the top 100 keywords in the first 10 weeks, joined the top 100 keywords in later weeks. The share of new keywords is higher for the first campaign but lower for the second and third campaigns. The share of former bottom keywords is higher for the first and the third campaigns but lower for the second campaign.

Table 5 shows the corresponding results for the top 100 keywords according to the number of clicks (in contrast to searches in Table 4). Both results are fairly similar, indicating that the set of the top 100 keywords changes over time. Thus, we only find moderate support for our Proposition 3.

6. Conclusion

Since Anderson (2006), the term “long tail” has enjoyed huge popularity, and advertising agencies and bloggers claim that the success in search engine marketing is driven by the long tail, which we defined in this research as the many less popular keywords entered by users to search the Internet. Advertising agencies have strong incentives to argue that search engine marketing campaigns need to have hundreds or thousands of keywords. The results of our empirical studies, however, tell a different story: the top 100 keywords—and not the very long tail composed of other keywords—generate the majority of searches, clicks and conversions. The top 20% most-searched keywords are responsible for 98.16% of all searches, 97.21% of all clicks and 94.32% of conversions, and the top 100 keywords cover 88.57% of all searches, 81.40% of all clicks and 79.45% of all conversions.

We show that these results are fairly stable between changes in the total number of keywords because an increase in the number of keywords beyond the top 100 keywords only slightly increases the number of searches, clicks and conversions. The implication of this finding is that rather few keywords are important for generating the vast majority of searches, clicks and conversions. However, our findings also show that the set of top 100 keywords varies over time, and new keywords, as well as keywords that previously did not perform very well, may replace some of the top 100 keywords. As a result, advertisers need to constantly analyze which of the keywords perform best, but they can still focus on the top 100 keywords to further analyze the success of their search engine marketing campaigns.

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