A study of Leakage Ratio for increasing performance of online keyword search advertising

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Abstract

\textbf{Background/Objectives:} In this study, research to improve efficiency of online advertising market, we would like to propose a new performance index called "Leakage Ratio" which can increase the efficiency of advertisement.

\textbf{Methods/Statistical analysis:} Naver, the Internet portal site in Korea, is the most influential medium for online keyword search advertising. In this study, Leakage Ratio management is applied to online keyword search ads for five medium and large size online shopping malls at Naver. Based on the performance trend of each search keyword, we tried to improve the efficiency of the whole advertisement by changing the bid of the low efficiency keyword.

\textbf{Findings:} If results of online keyword search advertising such as online shopping malls are reflected in sales through conversion process, ROAS(Return on Advertising Spend) will be used as a performance index. The proposed LR(Leakage Ratio) management reduces the wasted advertising costs by managing search keywords with low ROAS. Most studies of existing improve keyword search ads are based on surveys, so there are relatively few studies that used actual keyword search ad data for analysis. In this study, we carried out an experiment using actual online keyword search ad operation to confirm the performance of the proposed LR management for online shopping malls, and the results were compared and analyzed. As a result of the experiment, the waste of advertising expenses was reduced through LR management as low as 13% and as much as 46% at all 5 online shopping malls participating in the experiment. ROAS also increased as low as 4% and as much as 34%. It means whole ad performance was improved through LR management.

\textbf{Improvements/Applications:} By using LR, a new performance management index, online keyword search ads in online shopping malls will be able to improve ad performance without changing the cost of advertising.

\textbf{Keywords:} Search Advertising, Keyword Advertising, Leakage Ratio, Ad Performance, Performance Indicator, ROAS

1. Introduction
According to Korean Broadcast Advertising Corporation's survey, the domestic broadcasting ad sales in Korea which recorded 4,135 billion KRW in 2016 and fell 2.0% to 4,051 billion KRW in 2017. In 2018, it was 4,158 billion KRW estimated just 2.6% increased. On the other hand, online ad sales increased 14.9% from 4,155 billion KRW in 2016 to 4,775 billion KRW in 2017. In 2018, it was 5,513 billion KRW(estimated) increased to 15.5%. Looking at the absolute difference in sales, in 2016, online advertising generated about 22.6 billion KRW more than broadcast advertising. In 2017, the difference increased 723.7 billion KRW and it was estimated to be 1,355.6 billion KRW in 2018.[1]

Naver, the No. 1 portal service provider in Korea, posted ad sales of 2,967 billion KRW in 2016.[2] In 2016, three terrestrial broadcasters' advertising expenditures totaled 1,389.6 billion KRW, including MBC's total of about 596 billion KRW (total of headquarters and local companies), KBS about 420.7 billion KRW, and SBS about 372.9 billion KRW.[3] It was just about 46.8% of Naver, a single company. From the ad sales of Naver in 2013 exceeded the TV ad sales of the terrestrial broadcasters for the first time, the gap is widening. Nowadays, Naver has become the largest advertising medium, accounting for 24.4% of the domestic advertising market and 71.4% of the online advertising market.[4]

According to the research and analysis of online advertising industry trends published by Korea Internet Promotion Agency in 2017, 'search advertising' is the most preferred type among online advertising types with 62.8%. Advertisers of 31.5% also choose 'search advertising' type has the highest sales connection among online advertising types.[5] As such, search advertising is the most important type of the overall ad types. For this reason, companies which targeting domestic customers are using search ads as the main advertising means among online advertisings. In particular, the reliance on Naver search ads, which dominate the online advertising market, is increasing.

Keyword search ads are an advertising technique that allows advertisers to set a link to a search result page of customer's search keyword.[6] Main methods of operation of search advertising is registering and deleting search keywords, which are creatives, and adjusting keyword bids that determine the location of the advertiser's keywords in the search results that are shown when the customer searches for the keywords. Depending on the advertiser, the number of keywords ranges from a few tens to a few hundreds of thousands. Of the various industries that use search advertising, an internet shopping mall, especially a fashion category, not only has a lot of keywords, but also a lot of new product is registered every day. And keywords are registered and managed for each product. It is impossible to operate many keywords at the real time. It is common practice to manage to focus on only a few high-performing keywords, while managing the remaining keywords roughly into groups. As a result, every keyword advertising performance individually is not managed and operated, which leads to wasted advertising costs. It is necessary to analyze effect and optimization continuously since search ads which change quickly are not effective at all if you set up your ads once and do not follow up.[7]

The research on the operational performance of online keyword search advertising is divided two. One is the research on budget setting.[8,9,10] Most research on these keyword search ads consists of theoretical research methods, and relatively few studies have used actual keyword search ad data for analysis. In this study, online keyword search ads were actually run on advertising media for online shopping malls, and the results were compared and analyzed.

And the other is the study on various performance indicators.[11,12,13] These studies prove that top ranking of keyword search ad is not necessarily the place where profit or profit is maximized and increasing the advertising cost increases sales. Through the previous researches on the purchase conversion performance of the advertising, in the keyword search
advertising it is shown that between the advertising cost and the sales amount is positive 
relationship, and the efficiency of the advertising cost is increased as the number of keywords 
increases. However, as the number of keywords increases, the efficiency increase is limited 
due to the problem that all the keywords can’t be managed, and the waste of advertising 
expenses is increased. In this study, we propose Leakage Ratio as a new performance index to 
increase the advertisement performance without increasing the advertising cost and experiment 
the improvement of the advertising performance by applying Leakage Ratio management to 
the search advertising of the internet shopping mall.

2. Materials and Methods

Naver's keyword search ad is CPC type. Cost per click(CPC) is the amount that an 
advertiser pays when a user clicks on an exposed keyword, based on the keyword's bid.[14] 
Raising bids will increase search ad exposure rankings, show keywords at the top rank of 
search result, increase ad's clickthrough rate, but advertiser have to pay a high price for ad 
when someone clicks on the ad. If the advertiser lowers the bid, the cost will be lower when 
the customer clicks, but the search results will be lowered rank so that they will not be shown 
on the first page of the search result and will skip to the next page. It makes less effective 
advertising.

Return on Advertising(ROAS), an advertising performance indicator that shows the 
relationship between used advertising costs and sales, is a representative online advertising 
performance indicator used by the advertising industry. This is the rate of return of the 
advertising costs invested and shows the sales peradvertising cost 1 KRW. Higher ROAS 
means more advertising efficiency.[15]ROAS can be calculated as shown in equation (1). For 
example, if advertiser spend 1 million KRW in advertising costs and generate 5 million KRW 
in revenue from those ads, ROAS would be 500%. The high ROAS does not mean that the 
overall advertising performance is good always. In sample case, if the revenue, 4.5 million 
KRW generated from the only top 5% of the keywords, 95% of the remaining keywords 
contribute to just 0.5 million KRW. It can't be as a efficiency advertising performance.

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As a result, it is regarded that keywords with lower ROAS are wasted advertising costs. 
Leakage Ratio(LR) is a new performance index proposed as a method of improving overall 
performance by managing these low performance keywords. LR can be calculated as shown in 
equation (2). It means the ratio of the amount of the expenditure of advertising keywords 
whose ROAS is less than a certain ratio with respect to whole advertising expenditure. In other 
words, it means the ratio of the advertising cost used for the advertising whose performance is 
low among the entire advertisement cost expenditure.

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\]

For example, consider the performance of an online keyword search ad running a total of 
1,000 keywords as shown in Table 1 below. Only 55 keywords generate 66.2% of total sales 
and the remaining 945 keywords generate 33.8% of sales. On the contrary, it can be said that 
the keyword groups E and F loss from advertising operations because their sales are lower 
than their advertising expenses. In this example table, from group D to F are defined as 
low-performance keyword groups. LR is calculated to be very high as 66.7% from the total 
advertising costs are consumed by low-performance keyword groups.
Table 1. Example of Leakage Ratio

<table>
<thead>
<tr>
<th>Keyword Group</th>
<th>Number of Keywords</th>
<th>Average ROAS</th>
<th>AD Cost</th>
<th>Leakage Ratio Management AD Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>A group</td>
<td>10</td>
<td>300%</td>
<td>55,000</td>
<td></td>
</tr>
<tr>
<td>B group</td>
<td>15</td>
<td>200%</td>
<td>45,000</td>
<td></td>
</tr>
<tr>
<td>C group</td>
<td>30</td>
<td>180%</td>
<td>50,000</td>
<td></td>
</tr>
<tr>
<td>D group</td>
<td>50</td>
<td>100%</td>
<td>79,500</td>
<td>45,000</td>
</tr>
<tr>
<td>E group</td>
<td>250</td>
<td>75%</td>
<td>95,000</td>
<td>65,000</td>
</tr>
<tr>
<td>F group</td>
<td>645</td>
<td>20%</td>
<td>125,500</td>
<td>90,000</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td>450,000</td>
<td>450,000</td>
</tr>
<tr>
<td><strong>Sub Total (Low Performance)</strong></td>
<td></td>
<td></td>
<td>300,000</td>
<td>200,000</td>
</tr>
<tr>
<td><strong>Leakage Ratio</strong></td>
<td></td>
<td></td>
<td>66.7%</td>
<td>44.4%</td>
</tr>
<tr>
<td><strong>Total Sales</strong></td>
<td></td>
<td></td>
<td>520,850</td>
<td>690,750</td>
</tr>
</tbody>
</table>

Through the management of LR, the portion of the advertising costs consumed by low-performance keywords is converted to high-performance keywords. Thereby, the overall advertising performance was improved with reducing LR to 44.4%. Using ROAS and advertising costs in Table 1, sales can be calculated using equation (3). as a result, sales were increased 32.6% by lowering LR by 22.3%.

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(3)
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The above contents are an example to help understand. This study confirmed the change of overall advertising performance by applying LR management to the advertising operation of shopping malls that are actually operated. The experiment was conducted for three to ten weeks in each shopping mall, targeting five large and medium-sized fashion shopping malls with annual sales of over 10 billion KRW. To adjust the LR, the bid was adjusted according to the performance trend once a day. Low-performing keywords were adjusted to lower or not run bids, while high-performing keywords were adjusted to raise bids or resume operation. The adjustment conditions were classified into 30 stages as shown in Table 2 based on the 30 days prior to the previous date, the number of clicks, purchases, and ROAS performance. The results of the experiment were the change of LR, ROAS, and sales before and after the management of LR.

Table 2. Operation Conditions for Leakage Ratio Management

<table>
<thead>
<tr>
<th>Period</th>
<th>Condition(Click/Conversion)</th>
<th>Condition(ROAS)</th>
<th>Operation</th>
</tr>
</thead>
<tbody>
<tr>
<td>The day before</td>
<td>Click occurred</td>
<td>0%</td>
<td>down 7%</td>
</tr>
<tr>
<td></td>
<td>Click occurred</td>
<td>Below 100%</td>
<td>down 5%</td>
</tr>
<tr>
<td></td>
<td>More than 1 conversions occurred</td>
<td>500% or more</td>
<td>up 3%</td>
</tr>
<tr>
<td></td>
<td>More than 2 conversions occurred</td>
<td></td>
<td>up 5%</td>
</tr>
<tr>
<td></td>
<td>More than 5 conversions occurred</td>
<td></td>
<td>up 7%</td>
</tr>
<tr>
<td>Recent 7days</td>
<td>Click occurred more than 5 days</td>
<td>0%</td>
<td>down 10%</td>
</tr>
<tr>
<td></td>
<td>Below 100%</td>
<td>100%~200%</td>
<td>down 5%</td>
</tr>
<tr>
<td></td>
<td>1 conversion occurred</td>
<td></td>
<td>ON</td>
</tr>
<tr>
<td></td>
<td>More than 1 conversions occurred</td>
<td>500% or more</td>
<td>up 3%</td>
</tr>
<tr>
<td></td>
<td>More than 2 conversions occurred</td>
<td></td>
<td>up 5%</td>
</tr>
<tr>
<td></td>
<td>More than 5 conversions occurred</td>
<td></td>
<td>up 7%</td>
</tr>
<tr>
<td>Recent 3days</td>
<td>Click occurred more than 3 days</td>
<td>0%</td>
<td>down 10%</td>
</tr>
</tbody>
</table>
3. Results

The average number of operating keywords per shopping mall participated in the experiment was 7,300, and the average number of keywords whose bids were changed through the experiment was 114 per day. As shown in Table 3 and Figure 1, the experiments show that LR management improved advertising efficiency in all five shopping malls.

Table 3. Change of Leakage Ratio and ROAS

<table>
<thead>
<tr>
<th>Shopping mall</th>
<th>Leakage Ratio(%)</th>
<th>ROAS(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Before Management</td>
<td>After Management</td>
</tr>
<tr>
<td>A</td>
<td>65.35</td>
<td>57.00</td>
</tr>
<tr>
<td>B</td>
<td>46.77</td>
<td>40.79</td>
</tr>
<tr>
<td>C</td>
<td>35.33</td>
<td>19.20</td>
</tr>
<tr>
<td>D</td>
<td>17.70</td>
<td>10.59</td>
</tr>
<tr>
<td>E</td>
<td>16.35</td>
<td>12.71</td>
</tr>
<tr>
<td>Average</td>
<td>8.2</td>
<td></td>
</tr>
</tbody>
</table>

Shopping mall which had the most change of LR through LR management was "C", which decreased by 16.1% from 35.33% to 19.2%. However, ROAS was changed 27.4% from 291.12% to 318.48%, but not the most. Shopping mall which had the least change of LR through LR management was "E", down 3.6% from 16.35% to 12.17%. ROAS was changed 54.5% from 405.12% to 459.66%, but not the least. This shows that the decrease in LR is not proportional to the increase in ROAS.
Experimental results show that through LR management which bid adjustments for low-performing keywords are sequentially reduced by bid adjustments for individual keywords, and bids for higher-performing keywords are increased, all five shopping malls showed an increase in overall keyword ad performance.

4. Conclusion

This research suggests ideas about the wasting rate of advertising cost, LR that has not been managed in the meantime and applies them to fashion Internet shopping malls. As a result, we found that simply lowering the LR through management increased sales without raising advertising costs. This allowed us to produce meaningful experimental results that could improve overall advertising performance.

This experiment was conducted for a medium to large size shopping malls. In small shopping malls, usually ads aren't performing well and searching keywords are relatively few. As a result, applying the same rules may produce different results. Depending on the size of the shopping mall, it is necessary to study finding optimal percentage of ROAS for LR. In addition, unlike the shopping mall used in this experiment, we need to study finding a LR criteria other than ROAS to apply to advertisers whose purchase metrics are not identified due to purchase conversions.

References


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