Performance measurement of advertising actions: can web-metrics improve management control processes?

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Abstract. The aim of the paper is to describe through a case study how to measure the outcomes of a traditional advertising campaign through web metrics, usually adopted to evaluate the success of the company communication via the Internet. The results clearly show that web metrics (compared to traditional thought recall/listing measures) allow wide and multi-faceted insights about the customer response to advert. Furthermore they overcome traditional measures in terms of time and cost needs and in terms of timeliness.

Keywords: Performance measures; web metrics; effectiveness of advertising campaign.

1 Introduction

The effectiveness of a management control systems depends as first on how clear the strategy is formulated and depicted in all the most important key success factors and the management control actions needed to achieve the desired performance.

A sound performance measurement system (PMS) must be aligned to strategy and must consider all the measures that allow to verify whether management actions accomplish the desired results.

The design of a PMS, therefore, requires to select a set of measures that allow to quantify all the several strategic factors and management actions involved in the achievement of strategy. Managers involved in the PMS design could face problems of data availability and accuracy, especially when they need measures that allow to quantify the outcomes achieved in terms of market response to company's efforts.

The present paper intend to focus on the measures employed to assess the outcomes produced through an advertising campaign based on TV commercials. Our main intent is to compare the accuracy and significance of traditional measures, with the web metrics.

Web metrics allow to effectively measure the customers' interaction with company employed as a proxy of their cognitive response developed after being exposed

to the advertising. In particular the web metrics allow insights about the response function of customers expressed in terms of connections and navigation of the company internet site.

Usually the success of an advertising campaign is measured basing on the customers' perceptions, captured by employing surveys. This kind of measure may be biased by the fact that the consumers' opinions are collected on the initiative of the company that invite the customers to join the survey and to answer its questions.

 On the contrary interactive media allow to assess the intensity of the interaction between the company and its customers from the two both sides of the relation.

The employment of web measures as a proxy for the measurement of the success of an advertising campaign on traditional media represent a novelty. Usually the web metrics are used as a mean to evaluate the performance of web-advertising, web-communication and the interaction effectiveness between a company and its customers [1].

The results of the case study described in the following sections enhance the extant literature showing that web metrics can integrate and complete the traditional measures as they can provide new and interesting insights about the reactions of the customers. The results obtained could be useful also for managers involved in the company strategic planning and in the design of performance management systems in order to design more effective and reliable connections between company strategy, and consequent outcomes.

The paper is structured as follows: in the following section we describe the extant literature about advertising measures, then we discuss in deep the web measures adopted in the case study. In section 4 we discuss the main findings and finally some concluding considerations and directions for further research.

2.   Literature Review

Generally speaking, company's expectations about the outcomes produced by its advertising expenses might be roughly summarized in an influence on customers' behavior that result in a sales enhancement [2].

The assessment of sales outcomes consequent to the advertising does represent a big challenge in marketing literature which over time has been overlooked for two main reasons: 1) strong difficulties arise when trying to define the period of time during which sales improvement can reasonably be influenced by the advertising, and 2) it is generally considered easier and effective to focus the assessment on the changes in customers attitudes and perceptions induced by the advertising, rather than on the direct effect produced on sales, considering that advertising is only one of the numerous variables that are likely to impact on sales [3].

According to Stewart [4] the outcomes of advertising can be analyzed only by considering the underlying assumptions about the response function, the model

which is supposed to give raise to the response function and the measure employed to quantify the response.

The two basic models considered by theory are the replacement and the accumulation model, The former presumes that the increasing exposure to advertising allow to replace incorrect with correct responses, while the latter, conversely assumes that correct responses increase with exposure but compete with incorrect (or undesired) responses. The adoption of replacement model should require absolute measures of correct responses, since as consequence of increasing exposure to ads, they are assumed to replace the incorrect ones. Conversely the accumulation model assumes that the probability of a given response is a function of the strength of the desired response in connection with the strengths of all the competing responses; for that reason relative measures are considered more accurate.

One of the measures commonly used to assess the success of the advertisement policy is the correct recognition of the advertisement, obtained employing a hit rate and a false-alarm rate derived from psychophysics and other fields of study of experimental psychology [5]. The former is a ratio that express the number of the right targets chosen by a respondent above the total number of target presented, while the latter indicates the number of distractor which have been mistakenly chosen by the respondent above the total number of distractors presented. The false-alarm rate provide indications about the accuracy of the recognition. Leigh and Menon [5] in their study compared these standard measures with six alternative measures derived from threshold/choice theory and from the signal/detection theory and notwithstanding the strong differences in basic assumptions and formulas employed, surprisingly they found a significant convergence in the results provided by the set of measures considered.

Conversely almost all of the alternative measures show significant difficulties in their calculation and several of them are based on propositions that are, or may be in some cases false, or whose validity is difficult to be tested.

More recent studies suggest the employment of measures based on the assumptions that people react mentally to the advertisement and that reaction (namely cognitive response) maybe considered a significant determinant of the consumers' attitude change [6].

The main critics moved to the traditional though-listing measure relate to the biases concerned with the introspection needed to collect the data. The respondent might be unwilling or unable to answer, or his original thoughts might be conditioned or modified as consequence of new thoughts and experiences occurred after the exposure to the advertisement.

Neither the measure of cognitive response are free of criticism, in that the reaction of the respondent may not occur, or different person may reveal different kinds of reaction. Nevertheless, according to several authors cognitive measures are supposed to provide a clearer causal relation about advertising and its determinants, because they are less influenced by other factors.

Huang and Hutchinson [6] show that traditional thought-listing measures may fail in capturing specific cognitive responses known to affect attitudes and that tradi-

tional valence-weighted measures of cognitive response predict some, but not all, of the systematic variation in attitudes across people. Furthermore their results evidence that the measures they propose (thought recognition and belief verification) provide a greater predictive power and that implicit cognitive measures may be more effective when people are unable to access to their thoughts and when they should provide non-verbal responses. The measures are "implicit" when allow to assess reactions or thoughts that are unconscious or not easily controlled consciously.

According to Stewart [4], measures such as thought recall or recognition are affected by historical and environmental factors. The formers relate to the history of the previous exposure to the same advertising, or to the same campaign or to different campaign of the same product, or to different campaign of competitive product. Environmental factors relate to the customer knowledge about the product or brand and its personal attitudes and intentions. The combination of these factors may impact on the customer's learning process, through phenomena known as pro-active or retro-active inhibition.

Pro-active inhibition assumes that the higher the intensity of the exposure to several ads, the lower is the ability of the customer to retain information content from anyone ad, whereas retro-active inhibition assumes that things more recently learned, interfere with recall of older material.

The measurement of advertising effectiveness should also consider the media through which the message is delivered to customers. The several attempt to rank the different media in terms of effectiveness come to different result [7, 8], even if television is commonly considered as the most valuable source of advertising [9].

In particular television is more effective in catching the consumer attention and in stimulating the consequent purchasing action, whereas the internet is considered a more valuable media for what concern the potential to satisfy the consumers' information needs [10].

In the definition of advertising strategy television and the Internet are then seen as media which may allow synergies and interactions between a company and its customers.

For what concern the measurement of advertising effectiveness, the Internet allows to collect great amounts of data without generating significant costs and then it becomes easy to calculate a wide range of measures such as, exposure/popularity, stickiness and quality of user relationships, usefulness of content, just to name a few [1].

To our knowledge web metrics are widely used to assess the effectiveness of web advertising [1, 11], but given that the effectiveness of an advertising campaign can result as enhanced when television and the Internet are integrated, then our purpose in the present paper is to adopt web metrics to measure the success of a TV advertising campaign. In particular the web metrics should allow to isolate the interaction between the company and its customers which is likely to be triggered by TV ads. The web measures in this context may then provide a proxy for TV advertising effectiveness and insights on the consequent customer interaction with

the company by encompassing the above described problems and limitations connected with traditional thought listing or thought recall measures.

3.   Web Metrics

Web metrics record and analyze web data for purposes of understanding and optimizing web usage [12]. They can be used to estimate whether users' goals are being achieved and to provide feedback on website use to developers, managers, and other stakeholders.
Web site metrics play important roles in determining if the site performances are in line with the expectations of both the users and the company who manages it [13].
Since web metrics will help a company to stay on the right track by fine-tuning and optimizing their website, they can serve as an effective strategic tool [14].
Many different metrics have been developed to evaluate a website usage. Notable metrics most commonly measured by the organizations can be grouped into 4 categories, based on the objectives they intend to measure: traffic source metrics, user profiling metrics, navigation mode metrics, e-commerce metrics [15].
Below are described the most important metrics for each category.

Traffic source metrics
The traffic source metrics measure which traffic sources are driving visitors to the company website. There are three main traffic source metrics:
− direct traffic: visitors that visit the company website by typing URL into their browser.
− referral traffic: visitors that visit the company website by clicking on a URL on another website.
− traffic from search engine: visitors that discover the company website by entering a keyword in a search engine (Google, Bing, Yahoo, ect.).

User profiling metrics
The user profiling metrics allow to understand what are the characteristics of users that visit the company website. Some of these are:
− unique visitors: the uniquely identified clients that are generating page views or hits within a defined time period (e.g. day, week or month)
− new visitors: visitors that have not made any previous visits.
− returning visitors: visitors that have made at least one previous visit. The period between the last and current visit is called visitor recency and is measured in days.

Navigation mode metrics

The navigation mode metrics allow to understand how users interact with the company website. The metrics most commonly measured are:

- – visits: the total number of sessions held by visitors on the company website, typically measured on a daily basis. One visit is made when a user visits the site and accesses a series of pages.
- – page views: the total number of HTML documents accessed by visitors on the company website. One page view occurs when a visitor views a web page during his or her visit.
- – average page views per visit: the total number of page views divided by the total number of visits during the same timeframe.
- – page/session duration: the length of time, usually measured in seconds, for which a visitor stays in each page/session, as he or she navigates through the company website.
- – bounce rate: the percentage of visitors who leave after viewing one page
- – exit rates: the percentage of visitors who exit on a particular page after visiting more than one page.

E-commerce metrics

The e-commerce metrics provide information on activities and sales performance through the website. Some of this are:

- – conversion rate: the percentage of visitors who end up buying from the company web store.
- – visits to purchase: the average number of visits it takes for a user to convert.
- – average order value: the average size of an order on the company web store.
- – number of orders: the total number of transactions through the company website.
- – cart abandonment rate: the percentage of users who start the checkout process but do not complete it.
- – checkout page completion percentage: the percentage of users who get to the checkout page and complete their purchase.
- – average number of days to repurchase: the average number of days it takes for a previous purchaser to come back and make a subsequent purchase.

The web metrics allow then to measure the intensity and the success of the interactions between a company and its customers via the Internet. In that sense they can be employed as a performance measure in order to set targets and measure the achievement of results.

The extant literature about performance measurement suggests that measures have to be aligned with strategy. From this point of view, web metrics can help to measure the success of promotional efforts and particularly of al Internet advertising campaign, rather than the success of on-line sales, or the customer satisfaction about the information (about products, etc.) available on the company internet site.

In the case study described in the following section an original adoption of web metrics is proposed. In particular, web metrics are adopted in order to evaluate the success of a traditional TV commercial campaign. Given that synergic connections and integration between the Internet and the traditional media are documented by extant literature [10], it should be possible to measure if and how the traffic intensity of connections to a company Internet site change right after a TV commercial is broadcasted. If so the web measures could then catch up the customers' reaction to the TV commercial, providing then new and interesting insights that allow to draw more reliable relations between company commercial actions and expected outcomes.

4. Research method and findings

The case study concerns the TV advertising campaign launched by an Italian company operating in the kitchen furniture market. The campaign was broadcasted in the TV "prime time" during January 2013.

Originally the company decided to measure the success of the TV advertising (hereafter ad) campaign by adopting a traditional set of thought recall measures obtained through a telephone survey, aimed at evaluating in particular how the customers' brand awareness changed after the TV advertising campaign.

The survey involved in telephone interviews two random samples of telephone users, one before and one after the launch of the ad campaign.

The samples were creating by using Random Digit Dialling (RDD), that provides a representative probability sample of all telephone users, unlike telephone surveys which rely on registered telephone number lists or directories [13]. The two samples were obtained by employing the stratified sampling techniques. The stratification variables are the geographical area (the provinces), and the resident population in each province. The final samples were composed of 384 units[1].

The results obtained doesn't show a significant change in brand awareness after the launch of ad campaign (see Table 1).

Table 1. Brand recall before and after advertising campaign.

Brand recall	Before ad campaign	After ad campaign	df	χ^2	p-value
Yes	34,1%	36,6%	1	0,462	0,4968
No	65,9%	63,4%			

The reliability of findings in Table 1 is strongly influenced by the typical limitations of the telephone surveys.

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[1] In order to guarantee the geographical stratification of samples, mobile telephone numbers were excluded by the samples.

First of all, customers the samples may include only those people who own a resident (or an office) telephone number, thus is not possible to completely cover the target population. Considering the wide diffusion of mobile numbers, particularly the youngest and middle-aged people are less likely to subscribe contracts for a land line, than there is a relevant probability that the demographics of the people who have been involved in the survey do not match with the target of the ad campaign.

Furthermore, since the company produces and sell kitchen furniture (then "durable goods"), the level of commitment with the product (i.e. the respondents have been directly or indirectly involved in a purchasing experience or they are willing to be involved in the future) becomes particularly relevant. The random sampling does not allow to assess it ex ante, then the results could be significantly biased if a relevant portion of respondents is not interested in the product.

These limitations are reduced considerably by employing web metrics.

Through web metrics the consumers' response to ad campaign can be observed measuring the changes in their browsing behavior, as a proxy of involvement or interest triggered by the ad broadcast.

We compared the average value of web metrics reported in Table 2 before and after the ad campaign, and we performed a t-test to assess the statistical significance of differences. All the metrics we analyzed show an increase considerably during the broadcast of TV ads.

It is worth noting that for what concern the durability of the impact produced by the TV ad, the average value of metrics after the end of ad campaign, remained higher than before.

We interpret this result as a confirmation of a substantial increase in brand recall: the p-value of t-test (<0,001) shows the significance of the results.

Table 2. Web metrics: monthly comparison before, during, and after ad campaign.

	mean (before)	mean (during)	t	df	p-value	mean (after)	t	df	p-value
visits	1.949	4.344	-16,60	60	<0.001	4.166	-19,95	60	<0.001
pageviews	11.346	26.395	-16,10	60	<0.001	25.068	-18,54	60	<0.001
new visitors	1.264	2.908	-14,95	60	<0.001	2.702	-18,92	60	<0.001
daily unique visitors	1.703	3.804	-16,27	60	<0.001	3.623	-19,94	60	<0.001

We also analyzed the metrics of "traffic sources" , that consider the different methods through which the company Internet site has been accessed by viewers. Direct traffic, search engines, and referring sites are the alternative sources considered. More specifically, the direct traffic compared to accesses via search engines allow to understand whether the viewer kept in mind the website address and the brand name provided during the ad.

For viewers who accessed the site via search engines is also possible to analyze the keywords employed in order to evaluate the brand awareness: during the

broadcast of the ad commercials the employment of the keywords "kitchens Lube" increased remarkably (see Table 3).

Table 3. Traffic source metrics: comparison month before, current month, month after ad campaign.

	mean (before)	mean (during)	t	df	p-value	mean (after)	t	df	p-value
direct visits	540	1.064	-14,2	60	<0.001	1.045	-18,7	60	<0.001
search engine	1.182	2.711	-15,6	60	<0.001	2.554	-18,1	60	<0.001
keyword *"kitchen Lube"*	227	691	-14,6	60	<0.001	598	-15,9	60	<0.001
keyword *"LUBE"*	214	481	-13,1	60	<0.001	430	-15,2	60	<0.001

Finally also the metrics about the session length show a significant increase during and after the ad broadcasts (Table 4).

Table 4. Website engagement metrics: comparison month before, current month, month after ad campaign.

	mean (before)	mean (during)	t	df	p-value
average page view	5,79	6,08	-2,8	60	0,007
session duration (minutes)	6,04	6,37	-3,8	60	<0.001

The case study clearly show how wide is spectrum of analysis provided by web metrics also when employed to measure the outcomes produced by an advertising campaign broadcasted on a traditional media. Thus such set of measure can integrate and even further replace the traditional measures of advertising effectiveness.

It is worth to mention that web metrics allow significant advantages in terms of time and costs savings for what concern the collection of data and their elaboration. All the measure presented in Tables 1-4 are calculated on the browser-based web analytics platform used by the company (ShinyStat) that analyzes and displays web data in real time. The annual costs of service, (based on the number of monthly page views) are absolutely not significant.. In terms of timeliness the web metrics are available few seconds after the ad broadcast and they allow a real-time monitoring, whereas survey-based measures can be calculated only with a certain delay that might represent an additional bias in the accuracy of results as described above.

5. Conclusion

This paper shows how the web metrics may provide an exhaustive and multi-faceted picture of how consumers behave in response to advertising.

The results show that web measure overcome traditional thought listing/recall measures on several aspects.

In particular web measure allow to isolate the behaviors of "interested customers" those who react after or during the ad exposition by searching for additional information on the Internet.

The analysis of such behaviors provide managers relevant information to be employed in several different directions, in particular they allow to create more accurate performance measurement systems by considering the cause and effect relation between advertising campaigns and Internet interaction.

Furthermore the results obtained enrich the extent literature about measurement of advertising effectiveness. To our knowledge web metrics have never been adopted in the evaluation of a traditional advertising campaign.

The goal-directed behavior, in the form of consumer involvement or interest, has long been recognized as an important determinant of consumer response to marketing campaigns [16]. The interaction with a company website could then become a valid proxy to measure the level of commitment triggered by the advertising and then a valid predictor of a subsequent response. Consumers are likely to interact when the product or service is of high importance to them, when they are convinced that this interaction will be beneficial to them (e.g., when the interaction is consistent with their goals). Web metrics allow to capture and measure this interactivity, and thus seem to be more effective in assessing the success of an advertising campaign.

As final limitation of the study we must underline that employment in the case study of a durable goods company might represent a bias and do not allow to generalize the results obtained. In a consumer goods context need for additional information after the ad exposure could be significantly reduced and web metrics would not allow significant accuracy.

A possible direction for further research could be than to evaluate the robustness of web measures in the context of traditional media by comparing different operating context.

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