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FUZZY LOGIC ANALYSIS OF EFFECTIVENESS OF THE INTERNET ADVERTISING FORMATS IN INTERACTIVE TELEVISION

Рассматривается актуальная маркетинговая проблема, связанная с оценкой эффективности интернет-рекламы в формате интерактивного телевидения. Предложен метод для принятия решений при размещении заказа, основанный на многозначной логике и позволяющий эффективно использовать субъективную экспертную информацию.

In a context of technological convergence, the users indistinctly can accede to audiovisual contents through the television and Internet. The object of present work is evaluating the effectiveness of the Internet advertising formats in Interactive Television.

The new techniques derived from multivalent logic are an interesting alternative for decision making through order versus classical methods. Therefore, after the treatment of subjective expert input the results reveal that Internet advertising formats are not effectiveness in Interactive Television and it is necessary adapt them for improve the effectiveness of this formats to inform, persuade and remember.

1. Introduction

The changes produced in the development of different technologies of diffusion of the television (cable, satellite, TDT, ADSL, DVB-H, etcetera), the digitalization of the signal, the high definition (HDTV) and 3D, the convergence with Internet, the multimedia hard disks, the Personal Video Recorders (PVRs), as well as, the concentration in great multimedia groups and the appearance of new operators as Hulu, Netflix and Google TV, have modified the current panorama. All it has multiplied the number of television sets and the form of access and consume the audiovisual contents. In this environment we think that Internet business models as Google Search and advertising formats as Search sponsorship and others can be use in the Interactive Television, keep in mind the convergence of business models of both technologies.

Therefore the object of present work is study the effectiveness of the Internet advertising formats in the Interactive Television.

Following we review the efficacy measures of the advertising formats in others researches, after we propose the methodology for the analysis and contrast the hypothesis. Finally expose the conclusions and involvements for the advertising industry and future research possibilities.

2. Advertising efectiveness

Along the literature appreciate different measures of advertising effectiveness. Lavidge and Steiner (1961) use the Hierarchy Effects Model to measure the effects of the advertising in the phases of the process of disposition to the purchase: awareness, knowledge, taste, favourable attitude towards the product or feeling, conviction and purchase.

Stewart and Furse (1986) use the measures of efficacy proposed by the Research Systems Corporation: comprehension, persuasion and remember, to measure the efficacy of 1059 television commercials.

Aaker, Batra and Meyers (1992), as well as, Díez de Castro, Martin Armario and Sánchez Franco (2002) it proposes the use of variables related to profitability and the sales to measure the advertising effectiveness. Shelter in Clarke (1986) and Farbey (1994) warning about the difficulty to insulate the effects of the advertising effort in the sales, as well as, the delay of its effects.

This research uses, to measure the efficacy of the advertising formats, the basic ends of promotion instruments introduced by Kotler (1989): inform, persuade and remember, similar to the measures used by Stewart and Furse (1986).

3. Methodology

In order to analyzing the effectiveness of the Internet advertising formats in Interactive Television, propose a specific objective: determine if the Internet formats can be effective in Interactive Television or if it is necessary adapt them.

The hypotheses H_1, H_2 and H_3 will be allow determine that the Internet formats are less-effectiveness in Interactive Television and therefore it is necessary an adaptation.

H_1: The Internet formats occupy the first positions of the ranking of less-effectiveness in the ability to inform.

H_2: The Internet formats occupy the first positions of the ranking of less-effectiveness in the power of persuasion.

H_3: The Internet formats occupy the first positions of the ranking of less-effectiveness in the ability of making remember.

For the contrast of this hypotheses proposes analyze the efficacy of advertising formats, we keeping in mind, for a side, the importance that has the features that compose them to get inform, persuade and remember; for other, the desirable level of the feature that it must have to get it, and finally the degree which the advertising formats meet those features.

The analysis is based in two basic assumptions: first, overcoming the desirable level of the feature does not penalize the effectiveness of the format, and second, there is no characteristic that has a minimum level of compliance.

Table 1

Adequacy Ratio with Convex Weighting

Formats	R	P	I	Recall	Persuade	Inform
Format features	0,6	0,7	0,7	**0,300**	**0,350**	**0,350**
Vision	0,7	1,0	0,8	**0,091**	**0,121**	**0,104**
Images	0,8	0,7	0,8	**0,025**	**0,031**	**0,026**
Real images	0,6	0,9	0,9	0,015	0,022	0,016
Fiction images	0,4	0,4	0,6	0,010	0,010	0,010
Text	0,6	0,3	0,8	**0,019**	**0,013**	**0,026**
Corporate typography	0,8	0,5	0,1	0,004	0,002	0,001
Head	0,8	0,6	0,5	0,004	0,003	0,005
Body text	0,5	0,3	0,9	0,003	0,001	0,009
Slogan	0,7	1,0	0,5	0,004	0,004	0,005
Real colour	0,6	0,7	0,6	0,003	0,003	0,006
Video	0,8	0,9	0,8	**0,025**	**0,040**	**0,026**
Animation	0,7	0,8	0,8	**0,022**	**0,036**	**0,026**
Sonido	0,4	0,8	0,6	**0,052**	**0,097**	**0,078**
Music	0,8	0,9	0,5	0,038	0,058	0,028
Voice in off	0,3	0,6	0,9	0,014	0,039	0,050
Time	0,5	0,5	0,7	**0,065**	**0,060**	**0,091**
Free duration	0,7	0,8	1,0	0,030	0,023	0,048
Long <20"	0,3	0,5	0,3	0,013	0,014	0,014
Long >20"	0,5	0,8	0,6	0,022	0,023	0,029
Tamaño	0,7	0,6	0,6	**0,091**	**0,072**	**0,078**
Full screen	1,0	0,8	0,9	0,029	0,023	0,027
<1/4 Screen	0,5	0,4	0,0	0,015	0,012	0,000
1/2 Screen	0,7	0,6	0,3	0,021	0,017	0,009
3/4 Screen	0,9	0,7	0,6	0,027	0,020	0,018
Environment features of format	0,6	0,6	0,5	**0,300**	**0,300**	**0,250**
Timing	0,9	0,5	0,3	**0,063**	**0,039**	**0,026**
Before program	0,8	0,7	0,2	0,024	0,016	0,009
After program	0,7	0,5	0,1	0,021	0,012	0,004
In advertising bloc	0,6	0,5	0,3	0,018	0,012	0,013
Context affinity	1,0	1,0	0,7	**0,070**	**0,079**	**0,060**
Contexto immersion	0,8	0,8	0,5	**0,056**	**0,063**	**0,043**
Exposure place	0,7	0,5	0,5	**0,049**	**0,039**	**0,043**
In program	0,8	0,5	0,5	0,028	0,016	0,018
Out promgram	0,6	0,7	0,7	0,021	0,023	0,025
Ability to customize the message	0,9	1,0	0,9	**0,063**	**0,079**	**0,078**
Interactive feature of format	0,8	0,7	0,8	**0,400**	**0,350**	**0,400**
Program manulation	0,6	0,6	0,0	0,028	0,021	0,000
Product manipulation	0,8	0,8	0,8	0,037	0,028	0,046
Realization manipulation	0,5	0,6	0,3	0,023	0,021	0,017
Linearity	0,5	1,0	0,7	0,023	0,035	0,041
Navigation by menu	0,7	0,8	0,7	0,033	0,028	0,041
Browser navigation	0,5	0,2	0,1	0,023	0,007	0,006
Links presence	0,4	0,2	0,7	0,019	0,007	0,041
Data entry	0,7	0,6	0,6	0,033	0,021	0,035
Immediate response	0,8	1,0	0,7	0,037	0,035	0,041
Response post	0,5	0,6	0,5	0,023	0,021	0,029
Reply by same media	0,5	0,9	0,7	0,023	0,032	0,041
Reply through other channel	0,2	0,5	0,5	0,009	0,018	0,029
Leaving the television flow	0,6	0,9	0,6	0,028	0,032	0,035
Keep contact with the image	0,7	0,6	0,0	0,033	0,021	0,000
Keep contact with the sound	0,6	0,7	0,0	0,028	0,025	0,000

Advertising end	1 Inform	2 Persuade	3 Recall
1 Advertorials	0,5	0,5	0,8
2 Self-promotions	0,3	0,5	0,4
3 Banners	0,5	0,5	0,9
4 Animated banners	1,0	1,0	0,7
5 Bartering	1,0	0,6	0,3
6 Mask of entrance	0,5	0,5	1,0
7 TVMall	0,7	0,6	0,6
8 Morphing	0,7	0,9	0,8
9 Cursors	0,7	0,5	0,7
10 DAL	0,7	0,6	0,7
11 Sponsorship	0,0	1,0	0,7
12 TVMall Signatures	0,7	0,6	0,2
13 Impulse Response	0,0	0,0	0,0
14 Infomercial	1,0	0,9	0,8
15 Interstitials	0,4	0,6	0,4
16 SMSmessages & 905 lines	0,7	0,7	0,7
17 Microprograms	1,0	0,4	0,8
18 Microsite	0,2	0,6	0,0
19 Mini-Dal	0,6	0,8	0,4
20 Nested links	0,0	0,5	0,0
21 Active sponsorship	0,7	0,7	0,6
22 Search sponsorship	0,8	1,0	0,8
23 Interactive sponsorship	0,4	0,6	0,4
24 Passive sponsorship	0,0	0,8	0,0
25 Product placement	0,5	0,7	0,4
26 Rubli reportaje	0,4	0,6	0,4
27 Rich media banners	0,6	0,7	0,6
28 Overlays	0,7	0,8	0,7
29 Interactive spot	0,6	0,7	0,6
30 Spots	0,7	0,8	0,7
31 Telepromotion	0,6	0,7	0,6
32 Telescoping ads	0,6	0,7	0,6
33 Teleshopping	0,6	0,7	0,6
34 TV Site	0,6	0,7	0,6
1 Advertorials	0,9	0,6	0,8
2 Self-promotions	0,6	0,6	0,8
3 Banners	0,5	0,8	0,6
4 Animated banners	0,7	0,7	0,5
5 Bartering	0,5	0,8	0,8
6 Mask of entrance	0,7	0,7	0,7
7 TVMall	0,7	0,9	1,0
8 Morphing	0,7	0,7	0,7
9 Cursors	0,7	0,7	0,7
10 DAL	0,0	0,6	0,0
11 Sponsorship	0,5	1,0	0,8
12 TVMall Signatures	0,5	0,7	0,6
13 Impulse Response	0,7	0,7	0,4
14 Infomercial	0,0	0,6	0,1
15 Interstitials	0,0	0,6	0,0
16 SMSmessages & 905 lines	0,6	0,7	0,6
17 Microprograms	1,0	0,7	0,7
18 Microsite	0,7	0,7	0,5
19 Mini-Dal	0,3	0,5	0,3
20 Nested links	0,0	0,5	0,0
21 Active sponsorship	0,0	0,7	0,0
22 Search sponsorship	0,0	0,6	0,0
23 Interactive sponsorship	0,0	0,6	0,0
24 Passive sponsorship	0,0	0,6	0,0
25 Product placement	0,0	0,7	0,0
26 Rubli reportaje	0,0	0,6	0,0
27 Rich media banners	0,0	0,6	0,0
28 Overlays	0,0	0,6	0,0
29 Interactive spot	0,0	0,6	0,0
30 Spots	0,0	0,6	0,0
31 Telepromotion	0,0	0,6	0,0
32 Telescoping ads	0,0	0,6	0,0
33 Teleshopping	0,0	0,6	0,0
34 TV Site	0,0	0,6	0,0

The analysis of the formats effectiveness start with a fuzzy subset for describing (Kaufmann et al., 1986) formed with a referential composed by 41 features, 18 are related with the format (fiction images, real images, corporate typography, head, body of text, real slogan, colour, video, animation, music, voice in off, free duration, duration 20", duration 20", full screen, ¼ screen, ½ screen, ¾ screen); 8 are related with the context of insertion of the format (before the content, after the content, in advertising bloc, affinity of the context, immersion in the context, exhibition on the content, exhibition outside of content, message personalization ability); and 15 are related with its interactive ability (manipulate the content, manipulate the product, manipulate the realization, linearity, navigation by menu, browser navigation, the presence of links, data entry, immediate response, response post, reply by same media, reply through other channel, leaving the television flow, keep contact with the image, keep contact with the sound).

Keep in mind the 34 formats of Referential set (Kaufmann et al., 1986) F:

$$F = \{F_1, F_2, F_3, \ldots, F_{32}, F_{33}, F_{34}\}.$$

And the 3 proposal objectives:

$$O = \{O_1, O_2, O_3\}.$$

Experts suggest the principal features than configure the advertising formats and value all elements of the referential set for completing the characteristic membership functions (Kaufmann et al., 1986) of each fuzzy subset, so much of the formats:

	C_1	C_2	…	C_{m-1}	C_m
F_n =	$\mu_{C1}^{(n)}$	$\mu_{C2}^{(n)}$	...	$\mu_{Cm-1}^{(n)}$	$\mu_{Cm}^{(n)}$

Being $\mu_{Ci}^{(n)}$ valuations between [0, 1], m the number of features and n number of advertising formats.

As of the proposal objectives:

	C_1	C_2	…	C_{m-1}	C_m
O_p =	$\mu_{C1}^{(p)}$	$\mu_{C2}^{(p)}$	...	$\mu_{Cm-1}^{(p)}$	$\mu_{Cm}^{(p)}$

Being $\mu_{Ci}^{(p)}$ valuations between [0, 1], m the number of features and p number of advertising formats.

After the description by fuzzy subsets of all formats and the three specifics objective (table 1). Adequacy Ratio with Convex Weighting), experts have decided to weight each feature of each objective by convex weighting (Gil Lafuente, 1997):

$$\omega_n = \frac{\upsilon_n}{\sum_{i=1}^{n} \upsilon_i}.$$

Obtaining:

$$\omega_1 = \frac{\upsilon_1}{\sum_{i=1}^{n} \upsilon_i}, \omega_2 = \frac{\upsilon_2}{\sum_{i=1}^{n} \upsilon_i}, \ldots, \omega_m = \frac{\upsilon_m}{\sum_{i=1}^{n} \upsilon_i}.$$

In this case, it made “subweight” and "sub-subweight" according to feature sets analyzed (table 1).

Obtained the total of the necessary information, find the Adequacy Ratio with Convex Weighting (Gil Lafuente, 2002) that relate each of the formats of the analysis with the three previously established objectives, because the experts consider that, if the awarded value to the feature of the format exceed the objective, the degree of "proximity to the ideal", must follow being the maximum (if $\mu_{Ci}^{(n)} \geq \mu_{Ci}^{(p)}$, $\Pi_i (n \rightarrow p) = 1$):

$$\Pi_i (n \rightarrow p) = \omega_i[1 \wedge (1 - \mu_{Ci}^{(p)} + \mu_{Ci}^{(n)})].$$

Thus, it will obtain the coefficient between the objective 1 and the format 1:

$$\Pi (O_1 \rightarrow F_1) = 0{,}633$$

and, in the same way, all the remainders (table 1. Adequacy Ratio with Convex Weighting).

4. Resolution

The table 2 (Effectiveness advertising formats keep in mind proposal objectives), show the coefficients obtained for each advertising formats that indicate its ability to inform, persuade and remember, where 0 means that the format is not able to get the purpose end while 1 indicates that the format can get the totality of the purpose end. In any format are given maximum coefficients, so that it could venture to say that does not exist a format that allows get an absolute objective.

We add the row labelled "Total" to facilitate the selection of the format for the totality of its objectives, because the consulted experts accept a trade off between objectives.

With the results of the table 3 (Top 10 Less-Effectiveness advertising formats keep in mind proposal objectives) we contrast the hypothesis H_1, H_2 and H_3.

H_1: The Internet formats occupy the first positions of the ranking of less-effectiveness in the ability to inform. The cursors (0,483), nested links (0,572), TV-Mail signatures (0,586) and the TV-Mail (0,589) are in the top 10 of this ranking.

Table 2

Effectiveness advertising formats keep in mind proposal objectives

Objective	Advertorials	Self-promotions	Banners	Animated banners	Bartering	Mask of entrance	TV-Mail	Morphing	Cursors	DAL	Sponsorship	TV-Mail Signatures	Impulse Response	Infomercial	Interstitials	SM S messages & 905 lines	Microprograms	Microsite	Mini-Dal	Netsted links	Active sponsorship	Search sponsorship	Interactive sporsorship	Passive sponsorship	Product placement	Publirreportaje	Rich media banners	Overlays	Interactive spot	Spots	Teleprom otion	Telescoping ads	Telestopping	TV Site
Inform	0,633	0,687	0,568	0,544	0,716	0,593	0,589	0,557	0,483	0,816	0,602	0,586	0,713	0,669	0,592	0,637	0,605	0,788	0,761	0,572	0,671	0,619	0,617	0,589	0,544	0,605	0,594	0,521	0,874	0,653	0,647	0,639	0,668	0,761
Persuade	0,581	0,660	0,487	0,484	0,707	0,550	0,492	0,505	0,392	0,797	0,485	0,484	0,677	0,641	0,553	0,523	0,534	0,758	0,712	0,456	0,638	0,497	0,503	0,471	0,513	0,534	0,595	0,421	0,884	0,605	0,597	0,559	0,606	0,677
Recall	0,731	0,802	0,641	0,644	0,836	0,701	0,662	0,689	0,595	0,840	0,690	0,680	0,766	0,765	0,704	0,685	0,681	0,840	0,772	0,617	0,760	0,647	0,652	0,680	0,686	0,681	0,687	0,619	0,904	0,742	0,737	0,717	0,706	0,725
Total	**1,944**	**2,148**	**1,696**	**1,672**	**2,258**	**1,843**	**1,744**	**1,752**	**1,470**	**2,452**	**1,777**	**1,750**	**2,156**	**2,075**	**1,850**	**1,845**	**1,820**	**2,386**	**2,245**	**1,645**	**2,069**	**1,764**	**1,772**	**1,739**	**1,743**	**1,820**	**1,876**	**1,562**	**2,662**	**2,001**	**1,981**	**1,915**	**1,981**	**2,163**

H_2: The Internet formats occupy the first positions of the ranking of less-effectiveness in the can of persuasion. The couriers (0,392), nested links (0,456), signatures of dressing and softening fabric and fibres TV (0,484) and the TV post (0,492) are in the top 10 of this ranking.

H_3: The Internet formats occupy the first positions of the ranking of less-effectiveness in the ability of remember. The cursors (0,595), nested links (0,617), sponsorship searches (0,647) and the TV-Mail (0,662) are in the top 10 of this ranking.

Table 3

Top 10 Less-Effectiveness advertising formats keep in mind proposal objectives

	Inform			Persuade			Recall		
Ranking	Formats	Interactive	Puntuations	Formats	Interactive	Puntuations	Formats	Interactive	Puntuations
1	Cursors	OK	0,483	Cursors	OK	0,392	Cursors	OK	0,595
2	Layers	NO	0,521	Layers	NO	0,421	Netsted Links	OK	0,617
3	Animated Banners	OK	0,544	Netsted Links	OK	0,456	Layers	NO	0,619
4	Product placement	NO	0,544	Passive sponsorship	NO	0,471	Banners	OK	0,641
5	Morphing	NO	0,557	Animated Banners	OK	0,484	Animated Banners	OK	0,644
6	Banners	OK	0,568	Sign in TV-mail	OK	0,484	Search results sponsonship	OK	0,647
7	Netsted Links	OK	0,572	Sponsorship	NO	0,485	Interactive sponsonship of contents	OK	0,652
8	Sign in TV-mail	OK	0,586	Banners	OK	0,487	TV-mail	OK	0,662
9	Passive sponsorship	NO	0,589	TV-mail	OK	0,492	Passive sponsorship	NO	0,680
10	TV-mail	OK	0,589	Search results sponsonship	OK	0,497	Sign in TV-mail	OK	0,680

We can confirm the hypotheses H_1, H_2 and H_3. Then we can affirm that the Internet formats are less effectiveness of the advertising formats analyzed to inform, persuade and remember. Therefore they need adaptations to be effectiveness in the Interactive Television.

5. Conclusions

The development of the research confirm the outlined hypotheses and we conclude that it is necessary an adaptation of the characteristics that compose Internet advertising formats to improve their effectiveness to inform, persuade and remember in the Interactive Television environment. Thus, formats like cursors, nested links, TV Mail and the TV Mail signatures, must adapt to navigation flows of the Interactive Television.

The fuzzy logic methodology used in this work allows easily and rapidly measuring the advertising format effectiveness. For this study, we have kept in mind three measures of advertising effectiveness, in future research be able to adding other measures attending the wellness of obtained results with the proposed methodology.

The study was conducted for the Spanish market of the television, but could extend to other markets, resulting a multi-market study that allows comparing their differences. In the same way, could extend the research to others sectors as mobile phones or videogames, in an environment of technology convergence.

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