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MANAGERIAL PLANNING: HOW SCHEDULING INFLUENCES TV ADVERTISING EFFECTIVENESS

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Abstract: *The purpose of this research is to analyse the scheduling factors and their influence on TV advertising effectiveness. We deployed a quantitative approach based on a complete data set of advertisements aired on Czech TV in 2016 and 2017 for constructing a regression model. In contrast to several previous studies, our findings indicate that most analysed variables have only a negligible influence (length of spot, length of break, number of spots, position in break, category, day of the week, week, year, and interaction of week and year) on TV advertising exposure, while only the type of programme, daypart and TV channel show a relevant impact on advertising exposure.*

Keywords: *advertising management, commercial breaks, exposure, marketing communication, media scheduling*

JEL classification: *M37, M20*

INTRODUCTION

Every manager of either a global enterprise or a small family business faces the problem of managerial planning. A manager of any company using advertising tools or a manager of an advertising agency or a particular medium faces the problem of advertising planning and measuring its effectiveness (Kover et al., 1995; Biehal & Sheinin, 1998; West et al., 1999; King et al., 2004). The issue of managerial planning is a complex topic of managerial decision-making (Tapiero, 1977). Managerial decision-making in the sphere of mass media communication has various specifics that make it complicated. One such specific is the fact that the effectiveness of mass media communication and its real impact is difficult to

measure (Rubinson, 2009; Kelley et al., 2015; Percy & Elliott, 2016). Planning and decision-making in advertising management are based both on the internal processes and strengths of the company and the overviews and analyses of the competition's advertising campaigns, i.e. the prediction of the reaction of competitors (Batra et al., 2009; Jacobi et al., 2015). Advertising management requires an understanding of the entire marketing process (Arens & Bovée, 1994; Jugenheimer et al., 2014).

Advertising management comes into contact with the media, media planning or scheduling (Long & Wall, 2014; Jugenheimer et al., 2014) and also includes the concept of media planning, as advertising effectiveness depends on media space selection, planning of airing ads, advertising scheduling and timing (Arens and Bovee, 1994; Batra et al., 2009). Advertising management focuses primarily on deciding how to use particular media to effectively deliver the advertising message to recipients (Katz, 2017). The effectiveness of advertising can be derived primarily from an effective media plan (Arens & Bovee, 1994; Moriarty et al., 2014), as a medium is a tool through which something is achieved, expressed and communicated (Katz, 2017).

The topic of advertising effectiveness is often discussed in the academic community (Barry & Howard, 1990; Mela et al., 1997; Kieschnick et al., 2001; Tellis, 2003; Wilbur, 2008; Gijsenberg et al., 2009; Rubinson, 2009; Kelley et al., 2015; Percy & Elliott, 2016; Bellman et al., 2017). The problem of advertising effectiveness has been studied ever since its discovery and there is no single comprehensive solution because advertising effectiveness has many different definitions. Different subjects evaluate "effectiveness" differently (Reid & King, 2003). The differences are not only in the definitions of ad effectiveness but also in ways of measuring and controlling it. For example, the media defines effectiveness as an exposure of a target group; agencies consider effectiveness as the ability to position in the consumer's mind, while according to advertisers, effective communication should lead to the purchase decision. As a result, the subjects on the advertising market follow different aims and use different means to fulfil them.

Different concepts of the meaning of advertising effectiveness arise primarily from the nature of the media and advertising market, from the media space used to air advertising, and from the objectives of advertising management (Percy & Elliott, 2016; Katz, 2017). As this study focuses on the issue of media planning, advertising effectiveness is understood and measured as exposure for the purpose of this study. Exposure is the only meaning of advertising effectiveness that solely

depends on advertising scheduling, and contrary to other meanings (attitude, recall, purchase etc.) is not primarily influenced by advertising content and creativity (Kover et al., 1995).

Advertising exposure is the number of viewers exposed to an advertising message, i.e. the share of the population exposed to a message. Advertising space pricing is based on GRP (gross rating points), calculated as the exposure multiplied by the frequency (Katz, 2017; Kelley et al., 2015; Schultz et al., 2016). Therefore, the media are interested in maximizing the exposure to augment the price of the advertising space they sell (Lloyd & Clancy, 1991; Murray & Jenkins, 1992; Shachar & Anand, 1998). Selling media space for advertising purposes is for many Czech TV channels a primary and vital financial resource (Anderson & Gabszewicz, 2006; Gunina & Kincl, 2017). Nowadays, the number of TV viewers is declining and it is harder to address a mass audience (Danaher, 2017); therefore, the topic of advertising exposure has become a more topical issue than ever before.

Several studies have analysed the effect of the scheduling patterns of advertisements on exposure. TV channels with a larger audience can offer a greater exposure of the advertising space. Yuspeh (1977), Schultz (1979), Aylesworth and MacKenzie (1998), Furnham et al. (1998), DePelsmacker et al. (2002) suggest the media context/environment (particularly the type of TV programme) is the prominent factor influencing advertising effectiveness. Galpin and Gullen (2000) and Katz (2017) echoed the time of airing (or the daypart) as the prominent factor. Advertisements aired in the afternoon have the lowest recall whereas advertisements aired in the evening have the highest recall. The factors mentioned can radically influence viewers' attitudes and response to an advertisement and significantly affect whether the viewers remain in front of the screen to be reached by an advertisement.

However, others have identified other significant factors as the length of a spot, the length of a break, the number of spots in a break and the spot position in a break (Billet, 1993; Danaher, 1995). Billet (1993) analysed the influence of the length of the spot, the number of spots in a break and the position in a break, and found that the first spot in a break has a higher rating. Danaher (1995) conducted a comprehensive analysis of various factors and found that: a) the first spot in a break has a high recall and the lowest rating of all the ads in the break and the last spot in a break has a high recall and high rating; b) the number of ads in a break, the length of a break and the length of a spot influence viewing ra-

ting although not considerably; c) the type of programme has a strong influence on viewing rating; d) A break with shorter spots has a higher rating; e) too long and too short breaks have the lowest rating, f) the decrease in viewing ratings during a break cannot be fully explained only by these indicators. Contrary to this, Galpin and Gullen (2000) found that a) the middle spot in a break has a higher rating than the last and the first one (the first one has the lowest rating); b) spots in a shorter break have a higher recall than spots in a longer break; c) the less spots are in a break, the more effective are the advertisements in a break.

Our study aims to contribute to this debate and examine the influence of selected scheduling factors of advertisements on its exposure. The complete monitoring data sample used includes all advertisements aired on television channels on the Czech TV medium in 2016 and 2017. The dataset contained 11.269 million advertising spots from selected years and covered various timing and placement information for each advertisement (see Table 1 for the list of available variables).

Hence, we formulated the following research questions:
- RQ1: Which scheduling factors influence advertising exposure?
- RQ2: What is the impact of the selected factors on advertising exposure?

To increase the effectiveness of advertising, it is important to continue researching this issue (Arens & Bovee, 1994; Batra et al., 2009; Jacobi et al., 2015). This research on the TV advertising exposure can contribute to the development of the theory of advertising effectiveness and the theory of the advertising scheduling model. The development of theory in this field can be beneficial for organisations, the management of companies using advertising tools, for media, for advertising and media agencies. Acquiring new knowledge of this topic can also be beneficial for a state, as advertising can affect the economy of a state: advertising can influence aggregate demand and GDP, as well as employment and two separate markets: the media market and the advertising market (Norris, 1984; Nelson, 2005; Bagwell, 2007; Romat, 2008; Romanov, 2010; Plumer, 2012). It is a fact worth to mention that investing in mass media communication is a financially demanding cost item of business, so research on the effectiveness of advertising and the optimisation of advertising airing (or media space usage) is essential for adequate spending and return on investment. Thus, advertising managerial planning can greatly influence the strategic management of a business and cannot be regarded merely as a support mechanism. This research has the potential to make a theoretical contribution while also considering the practical implications.

METHODS

The research uses a quantitative approach based on the complete monitoring data sample, which includes all advertisements aired on television channels on the Czech TV medium in 2016 and 2017. Data is provided by the media research agency Nielsen Admosphere and concerns 5.661 million advertising spots in 2016 and 5.608 million advertising spots in 2017. Spots missing at least one value of the analysed variables were removed from the dataset. The final research sample contains a total of 11.212 million spots. Table 1 shows the influences of all independent variables that were analysed. In 2016, there were 44 channels on the Czech TV market belonging to seven TV platforms (Gunina & Kincl, 2017). As a product category, we used NACE third level categories to classify low or high involvement products (Rossiter et al., 1991) and immediate or long-term consumption products. The set of analysed variables resulting from the literature review is also caused by the disposability of the provided dataset.

Table 1. Examined input variables (predictors)

Group of channels (TV outlet)	TV channel
Programme type (before break)	Programme type (after break)
Product category	Length of break
Number of spots	Position in break
Length of spot	Year of airing
Week of airing	Month of airing
Time of airing	Day of airing

Exposure of an individual ad spot is entered into the model as a dependent variable. Exposure is represented as a percentage of the population that was exposed: the condition is that the person viewed the whole spot (if a spot is three minutes long or shorter) or at least viewed three minutes if a spot is longer than three minutes. Exposure data is collected using a panel (TV meter) where one respondent (a household) represents a proportional part of a particular consumer segment. The TV meter does not measure only the time that the TV is on but works on a mechanism where a member of the household must log in and stay logged in throughout the whole period of exposure to the TV medium and must log out when leaving the room (Danaher, 1995). This enables to avoid a measuring error when the TV is on but the viewer is out of the room. Nevertheless, this research has some limitations caused by the data set. The sample only includes data for the traditional TV medium – postponed viewing and online TV are not included in this research. However, the analysis of these areas can provide important re-

sults as some consumer segments tend to prefer online TV or other video media (Fudurić et al., 2018) rather than media from a traditional TV receiver.

The data needed to be transformed before the analysis and the time of advertisement broadcasting (hour-minute-second) was transformed to daypart. Katz (2017) defines nine dayparts for the American market. As the Czech media market differs from the American one, we defined the dayparts according to media habits in the Czech Republic: Late night (11 p.m. – 1 a.m.), Dead time (1 – 6 a.m.), Early morning (6 – 9 a.m.), Daytime (9 a.m. – 12 p.m.), Early fringe (12 – 5 p.m.), Evening (5 – 7 p.m.) and Primetime (7 – 11 p.m.).

The regression analysis with qualitative predictors was used to identify the set of variables influencing advertising effectiveness. All available factors that could potentially influence advertising exposure were analysed in order to avoid multicollinearity that could threaten the accuracy of the parameter estimation in regression methods. First, we removed the factors that were strongly dependent by their definition. The remaining set of factors was analysed using variance inflation factors (Weisberg & Fox, 2011) adjusted by the degrees of freedom in order to correctly proceed with the qualitative predictors.

After the necessary reductions, we conducted a regression analysis with both qualitative and quantitative predictors. To capture the differences in weeks of both years we included the interaction between weekly and yearly predictors. The amount of data in both years describing the whole TV advertising market expectably leads to the significance of all predictors; therefore, it is not reasonable to employ the usual t-test and F-test of significance. Instead, we measured the "impact" of all factors using effect size estimation (Fritz et al., 2012) for an ANOVA table computed for the predictors of the regression model. The effect size describes the proportion of variability explained by a particular variable using a measure called partial eta squared , which is defined using the sum of squares from the ANOVA table of the resulting regression model. The resulting sizes of the effect are evaluated according to the scales of Sawilowsky (2009) and Cohen (1988).

FINDINGS

Two variables were removed from the model before testing because these variables appeared to be redundant as repeated information provided by other variables. Hence, these variables must have caused multicollinearity. The group of channels variable is an aggregated variant of the TV channel variable and the

month of airing is strongly dependent on more detailed frequencies in the variable week (order number in a year) of airing. After this reduction, we concluded using generalized variance inflation factors that all remaining factors appear to be sufficiently independent of other predictors and do not cause multicollinearity. As expected, all regression parameters appeared to be significantly measured by p-values in the F-test of significance. The high levels of significance were caused by the rather large extent of data that exhaustively depicts the whole TV advertising market in the analysed years and hence the testing of the predictors' significance is useless. The stepwise model selection procedure showed that none of the eleven variables can be excluded from the model without significant loss of accuracy (tested using the sub model F-test). The results show the models containing twelve factors and one interaction between two factors (RQ1).

Table 2. Characterisation of factors and effect sizes in ANOVA table for 2016 and 2017 data

	Df	Sum of squares	F-value	P-value	Effect size [in %]
TV channel	46	4779554	238550.3	$< 2.2\times10^{-16}$	49.466
Programme type (before break)	58	563818	22318.3	$< 2.2\times10^{-16}$	10.352
Programme type (after break)	58	162410	6428.9	$< 2.2\times10^{-16}$	3.230
Length of spot	1	13703	31459.4	$< 2.2\times10^{-16}$	0.280
Length of break	1	55662	127794.5	$< 2.2\times10^{-16}$	1.127
Number of spots	1	440	1011.3	9.9×10^{-06}	0.009
Position in break	1	46	106.6	2.6×10^{-14}	0.001
Category	21	862	94.2	$< 2.2\times10^{-16}$	0.018
Day of the week	6	3398	1300.3	$< 2.2\times10^{-16}$	0.070
Week	51	22835	1028.0	$< 2.2\times10^{-16}$	0.466
Year	1	59	135.6	$< 2.2\times10^{-16}$	0.001
Daypart	7	370388	121481.2	$< 2.2\times10^{-16}$	7.051
Week: Year (interaction)	51	1554	70.0	$< 2.2\times10^{-16}$	0.032
residuals	11210141	4882708			

Table 2 shows the effect size of the remaining variables, which was used to measure the influence of the analysed scheduling factors on advertising exposure (RQ2). The resulting effect sizes are very small, i.e. of the order of 0.01 (Sawilowsky, 2009), small with a value close to 0.2 or medium with a value of around 0.5 (Cohen, 1988). The resulting effect size achieved the level of medium only in

case of the TV channel and the size close to small only in case of the variable programme type (before a break). All other effect sizes (daypart, length of spot, length of break, number of spots, and position in the break) were very small (Table 2). It is obvious that the variable TV channel strongly influences the exposure of advertisements and has the strongest effect. This, together with the overall values of the adjusted R-squared, (equal to 0.5503) implies that all the factors measured in the analysed data set only partially describe the exposure of the advertisements since the remaining variability is unexplained by the models.

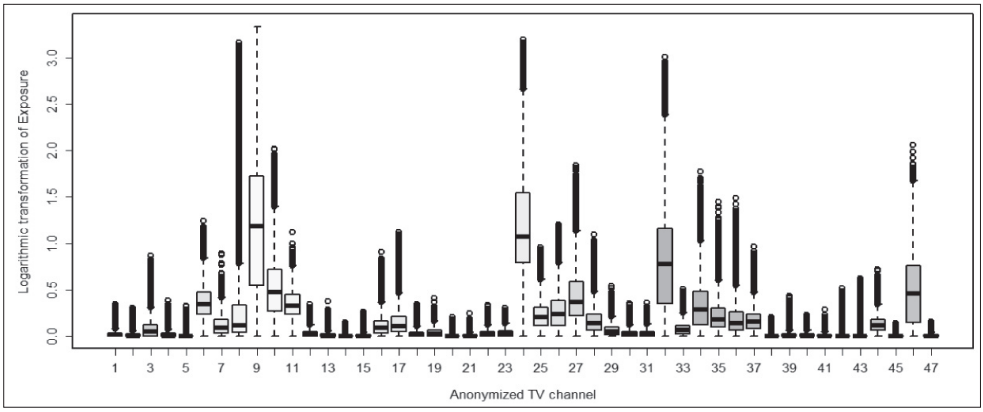

Figure 1. The influence of a TV channel on TV advertising exposure

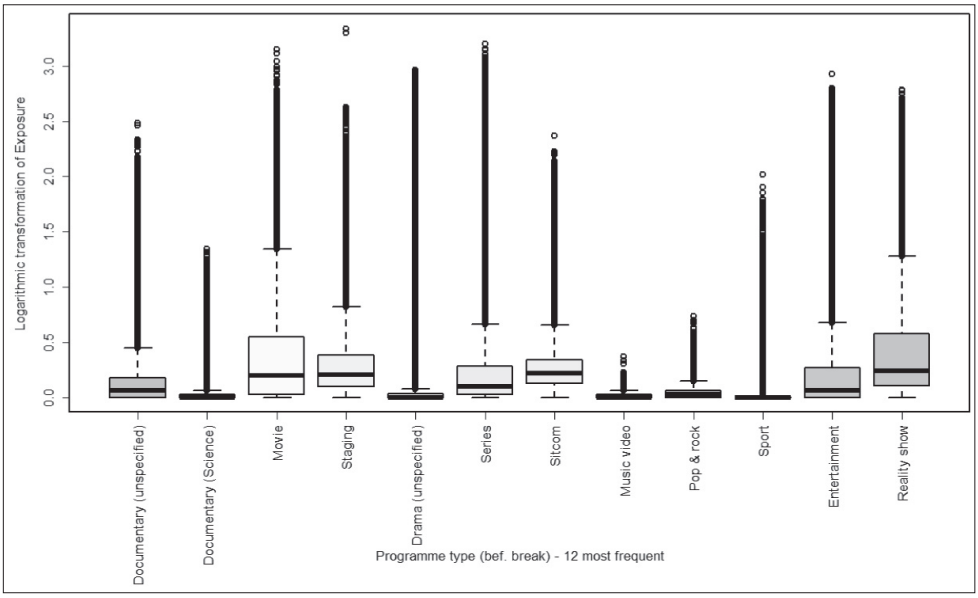

Figure 2. The influence of the programme type before a break on TV advertising exposure

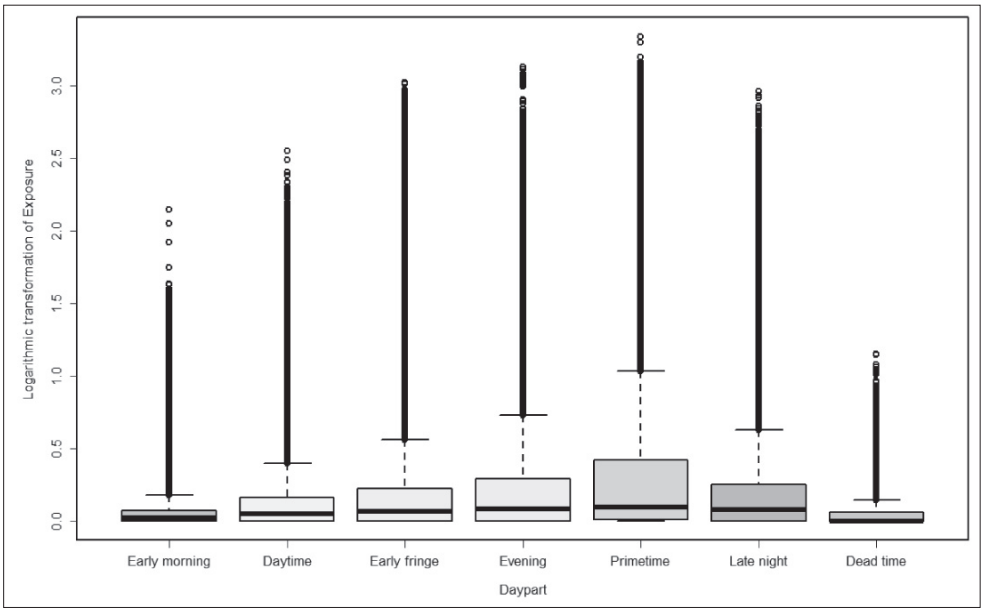

Figure 3. The influence of daypart on TV advertising exposure

Figure 1, Figure 2 and Figure 3 show the impact of the variables that have the relevant effect size in relation to TV advertising exposure. The course of Figure 3 can be expected, as Dead time does not include the high value of advertising exposure, contrary to Early fringe, Evening, Primetime and Late night. Figure 1 shows a substantial spread in exposure values depending on the TV channel. Similar to this, Figure 2 shows large changes in exposure regarding programme type. From the managerial point of view, it is an important finding that channel and programme selection is an essential pillar of advertising effectiveness.

DISCUSSION AND CONCLUSION

The results indicate that some of the pricing mechanisms in media space planning and selling might have some kind of rationale. Even though the analysis revealed a statistically significant difference in exposure for all predictors (TV channel, programme type before a break, programme type after a break, length of spot, length of break, number of spots, position in break, category, day of the week, week, year, daypart and interaction of week and year), the real size of the effect – as indicated by partial eta squared – was almost none to very small (see the effect sizes in Table 2). The effect size was medium only in the case of the TV channel and small for the programme type and daypart. However, such results were expected. On a TV channel with a large audience, the exposure of the

advertisements is also expected to be large. Similarly, when a large audience is watching a TV programme, most do not switch to another TV channel when the programme is interrupted by a commercial break. This is in line with previous studies, which echoed the TV channel as the most prominent factor influencing the exposure and concluding that the programme type (in which the ad break is placed) is also important (Katz, 2017; Danaher, 1995).

Contrary to Billet (1993) or Galpin and Gullen (2000), we do not support the conclusion that the advertising exposure differs according to its position in the break or the number of spots in a break. Therefore, asking a premium price for example for the position of the spot in the commercial break or for spots in shorter breaks has little support in terms of real data. However, such a conclusion would require a more in-depth analysis, as our model only partially explains the variance of exposure. The R-squared value (0.5503) implies that there are other factors (not measured or immeasurable factors) that could explain the changes in advertising exposure and that are not included in our data. Moreover, the exposure measure in the dataset reflects the viewing audience as a whole and does not provide detailed information about various segments or groups of media consumers. Further subsequent research can explore not only the relationship between exposure and other variables but also the relationship between all variables in a model and regard the segmentation of the audience according to the consumer profile.

We studied the advertising effectiveness on the Czech TV market; however, the findings can be beneficial for the whole Central and Eastern Europe TV market, as the model of media scheduling and media space selling does not differ much in the states of the CEE region. As the advertising market of only one particular state was analysed, the results of this study can only be generalised with caution.

From a practitioner's and managerial point of view, our study contributes to the debate on the importance of detailed advertising planning and scheduling. Instead of wasting money or spending time negotiating a better position for their ads, the marketers should focus on other aspects of their advertisements (i.e. if the message is clear and understandable to its audience, whether it imposes attention/awareness, comprehension, conviction, or even desire and action).

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