

APPLICATION OF REGRESSION MODELS IN ANALYSIS OF THE ADVERTISEMENT'S IMPACT ON CONSUMER'S DECISION MAKING PROCESS

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Abstract Consumer's behaviour in the market is a widely studied and analysed problem. Complexity of social, economic and psychological determinants that influence consumer's decision process is a reason for multilevel and multi-factor approaches to analyse this problem. Therefore the aim of this paper is to describe application of parametric regression model for the effectiveness of advertising. The study described is based on a survey covering 550 consumers of dairy product, all of age over 15 and living in one of the nine biggest Polish agglomerations. Built models were examined and verified statistically. Obtained results clearly show that the approach chosen to describe AIDA model is an appropriate method for analysing impact of advertisement on consumer's decision making process.

Keywords: regression, consumer's decision making process, advertising, AIDA model

INTRODUCTION

Advertisement is the basic form of the company's communication with the market. It is the information connected with the persuasive message. Advertisement not only informs the consumers about the goods and services, but it also aims to persuade them to purchase the advertised goods or to use the specified services [Kotler 2005]. The impact of advertisement on the consumers' purchase decisions is complex and difficult to describe in full. What is particularly difficult is the analysis of the impact of the consumers' decision-making process on the effectiveness of advertising. Literature research [Świątkowska, Berger 2001,

Szwacka-Salmonowicz 2003] confirms that this issue is poorly researched in relation to individual product groups. No indication of the direct relevance of the shape of the process in advertisement creation invokes its limited use in practice. This is due to the descriptive nature of the decision-making process, and thus the difficulty in identifying its relationship with the effectiveness of the advertisement [Maison, 2007].

Studies on the influence of advertisement on the decision-making process resulted in many models. One of them is the AIDA model developed by L. Strong. This model assumes the hierarchical and cause and effect impact stages of the advertisement on a consumer. The model assumes that in each subsequent step the number of recipients of advertisement is reduced [Barry, Howard 1990]. Widely known in the theory, the model is not practical, hence rarely in use. Selected works [Gharibi et al., 2012] show that AIDA model is useful in the effectiveness of advertising research¹.

During the decision-making process it is possible to distinguish the following stages [Engel, Blackwell, Kollat 1968]: problem recognition, information search, evaluation of alternatives, decision implementation, resigning from the purchase, post-purchase processes and post-purchase evaluation. Some authors limit the role of the advertisement only to the stage of making people aware of the need and raising interest [Mazurek-Łopacińska 2003]. However, most of the respondents agree on the existence of a different meaning and effect of the advertisement in particular stages of the decision-making process [Łodziana-Grabowska 1996, Jachnis 2007]. It seems that the appropriately selected set of features and elements of the advertisement may have an impact both at the time of the formation of the need to purchase and during the consideration of available possibilities to meet this need or after the purchase. In addition, it seems that the effectiveness of the advertisement message is different depending on the current consumer's stage of making the purchase decision.

From the advertiser's point of view, the advertisement should be directly addressed to the current consumer's stage. In practice, it is not always feasible. It is also impossible to identify groups of consumers passing through various stages. On the other hand, the impact on all stages would require huge financial investments, and the results of the studies [Łodziana-Grabowska, 1996, Pociecha, 1996] do not clearly indicate which advertisement stages may have the greatest efficiency. The extraction of these stages would allow the advertisement impact only on these stages of the decision-making process which are important from the sender's point of view. Such an action would permit to minimise the incurred financial expenditures, as well as to actively enhance and suppress individual stages through the marketing communication. The effect of such action would therefore be the creation of such advertisement which strengthens the stages of great importance,

¹ In marketing, the effectiveness of advertising is defined as the degree of advertisement of goal achievement [Bendixen 1993].

and weakens the stages of low importance for the advertiser. Therefore, it is reasonable to conduct research in this field.

MATERIALS AND METHODS

The aim of this study was to analyse the impact and significance of the advertisement in shaping the consumers' behaviour on the example of the dairy market. To verify that goal the dairy products are divided into two categories: traditional products (e.g. butter, milk well known to the market) and new generation products (e.g. dessert or dairy drinks, new to the market). In the next step of the research, consumers' reaction was also examined.

The study covered dairy products' consumers aged over 15, who declare intake of at least, one of the tested sub-category of dairy products (traditional or new generation) and have access to different forms of advertisement. The advertisement accessibility increases with the size of the city. Hence, the respondents for the study were selected in 9 Polish cities.

Results were collected using two different surveys. One of the surveys contained questions concerning the advertisement's impact described in the AIDA model. The second one included a list of statements described in the Likert scale, which determine the intensity of occurrence of the various stages of making a purchasing decision. Each stage is tested separately and qualification for the various stages were decided through the analysis of variation from the average results for the different stages of decision making process.

The data was collected by using the CAWI method and 630 questionnaires were obtained during the study. During the initial data analysis, some questionnaires were rejected on the basis of database cleanup from vague, arbitrary and contradictory information. Finally, 550 surveys. The analysis was performed using the parametric regression methods. The SPSS and R programs were used for the study².

In order to determine the pattern of consumers' conduct on the dairy market, the answers were averaged (obtained in the scale of 1–5) from statements attributed to particular stages. The results were considered as independent variables for each consumer's individual phases. In order to determine the stages of the greatest importance for the effectiveness of the advertisement, the regression model was built. The weighed AIDA index³ was adopted as a dependent variable. The

² The article uses the studies' results included in the thesis of one of the article's authors (available but not published). It is held in accordance with the Law on Copyright and Related Rights Act of 4 February 1994, published in OJ 1994 No. 24, item. 83. The contribution of the two authors of the article equals 50%.

³ The dependent variable was defined in the models as the advertisement effectiveness. It is expressed by the weighed mean developed based on the theoretical AIDA model. The attention was operationalized by the declaration of absorbing advertisement of dairy products, the interest – as the declaration of increased interest as a result of the advertisement, the desire to purchase – as the

averaged values of the answers for subsequent stages of the decision-making process were adopted as the independent variables [Engel, Blackwell, Kollat 1968)]. The defined decision making stages are: problem recognition (I), information search (II), evaluation of alternatives (III), decision implementation (IV), resigning from the purchase (V), post-purchase processes (VI), post-purchase evaluation (VII).

RESULTS

The relationship of advertising and decision-making on the dairy market

Model 1. determining the impact of the stages of the decision-making process on the growth of the advertisement effectiveness of dairy products adopted the linear form. Details of the estimation are presented in table 1.

Table 1. Results of estimation of model 1.

	Non-standardized coefficients		Standardized coefficients	<i>t</i> Statistic	<i>p</i> value
	<i>B</i>	Standard error	<i>Beta</i>		
Constans	-0,046	0,043		-1,071	0,285
Stage II Information Search	0,166	0,018	0,405	9,374	0,000
Stage III Evaluation of Alternatives	-0,034	0,008	-0,170	-4,453	0,000
Stage IV Decision Implementation	0,036	0,014	0,109	2,523	0,012

Source: own calculations

Model 1. explains 22% of the variable variance AIDA ($R^2 = 0,224$, $R_s^2 = 0,220$). In addition, based on the analysis of both measures the validity of the reference to the model's results can be confirmed to the whole population from which the test sample came⁴. The value of the *F*-Snedecor statistics ($F_{3;546} = 52,517$)⁵ which allows to reject the hypothesis of the zero value of coefficients β ($H_0: \beta_1 = \beta_2 = 0$). Such result proves the correctness of the estimated model. In the further part of the analysis the correctness of the model

positive attitude towards the advertisement, and action – through the declaration of purchase under the influence of the advertisement. This way to operationalize the AIDA variable was not used so far in the literature, and it represents an innovative authors' approach. This part of the study with the detailed description was presented in the paper [Chudzian, Chrzanowska 2014].

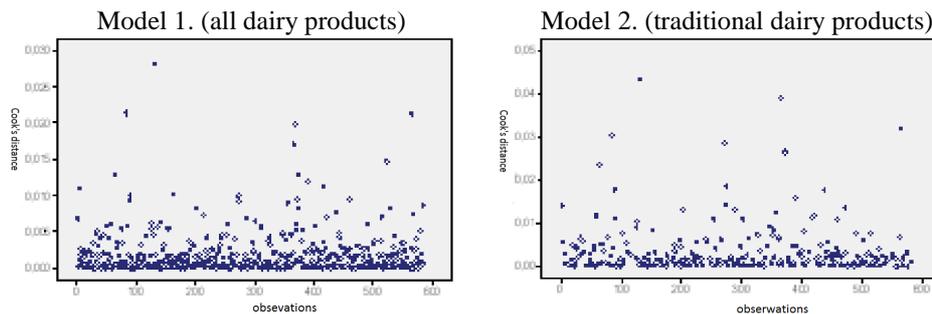
⁴ The difference below 0,01 between R^2 and R_s^2 means the random sampling and the possibility to generalise the model results on the population (Field, 2005).

⁵ p value < 2,2e-16.

was verified through the additional analysis of residues. Detailed results are given in figure 1. All regression coefficients with the independent variables in the presented model are statistically significant. The full analysis of variance model is presented in table 2.

From the advertisement effectiveness point of view, there appeared three major purchase processes in the constructed model (Table 1.). The most important of them, which has the highest standardised regression coefficient Beta, is the stage of information search about the product. Another important stage refers to the circumstances of the purchase decision. Both of them received the positive coefficient, which means that the increase in the occurrence of these stages in consumers' behaviour which causes the advertisement effectiveness increase. Thus, the impact and formation of the advertisement composition which strengthens the occurrence of these stages causes greater effectiveness of the advertisement. In turn, the occurrence of the stage of choice of alternatives weakens the effectiveness of the advertisement (negative standardised Beta coefficient), so the sender's goal should be to persuade the consumers to resign from product comparison.

Figure 1. Residual analysis (Cook's distance)



Source: own elaboration

Table 2. Analysis of variance model 1 for dairy products

	Sum of squares	<i>df</i>	mean square	<i>F</i> Statistics	<i>p</i> value
Regression	7,161	3	2,387	52,517	0,000
Rest	24,815	547	0,045		
Total	31,975	550			

Source: own calculations

Comparing the obtained results to the actual nature of the decision-making process on the dairy product market, it can be stated that it seems reasonable to lower the stage of the assessment of alternatives, which is actually observed for the given market. It seems that due to the stated high degree of the post-purchase evaluation, highlighting in the advertisement differences between the competing products may bring about unnecessary

consumer's interest in other available brands. In turn, the absence of stages: information search and the purchase decisions, prevents the active acquisition of new clients through their attainment, among others, to press advertisement, Internet advertisement or promotions in the sale locations. Supporting in the advertisement communication the active search for information thus causes the increase of advertisement effectiveness, that is the increase in purchase. What is also interesting is the comparison of values of the standardized Beta coefficients, which shows that the strongest effect (in terms of the absolute value) is found in the stage of information search, and the weakest – the decision to purchase. This information may suggest the possible division of means in the advertisement budget.

It seems that the impact on other stages, already existing in the decision-making process (problem recognition and post-purchase evaluation), is irrelevant from the point of view of the effect on the size of their purchases. This would suggest, therefore, that these stages occur on their own and investing funds in their support is not advisable.

The relationship of advertising and decision-making process in the market of traditional products

The linear regression model specifying the impact of individual stages of the decision-making process on the increase of the effectiveness of the traditional dairy product advertisement (model 2.) also adopted the linear form. Detailed information is provided in table 3.

Table 3. Results of estimation of model 2.

	Non-standardized coefficients		Standardized coefficients	<i>t</i> Statistic	<i>p</i> value
	β	Standard error	<i>Beta</i>		
const	-0,067	0,059		-1,131	0,259
Stage II Information Search	0,207	0,023	0,480	8,856	0,000
Stage III Evaluation of Alternatives	-0,031	0,011	-0,149	-2,744	0,006

Source: own calculations

Model 2 explains more than 22% of the variance of the variable AIDA ($R^2 = 0.227$, $R_s^2 = 0.221$). The additional diagnosis confirming the correctness of the model was shown in figure 1⁶. Regression coefficients with independent variables are statistically significant. The full analysis of variance model is presented in Table 4. The value of F-Snedecor statistics ($F_{2, 272} = 39,922$) allows to reject the hypothesis of zero *Beta* coefficients with significance *p* value = 6.28e-16.

⁶ For more details about outliers see Cook (1982).

Table 4. Analysis of variance model 2 for traditional products

	Sum of squares	<i>df</i>	mean square	<i>F</i> Statistics	<i>p</i> value
Regression	3,605	2	1,803	39,922	0,000
Rest	12,281	272	0,045		
Total	15,886	274			

Source: own calculations

In case of traditional products a very simplified decision-making process was observed, limited to the feeling of the need, occurrence of post-purchase processes and post-purchase evaluation. In comparison with the results obtained for this model, it can be concluded that the possible effects on the purchase by the structure of the advertisement based on the decision-making process are also simplified. They are limited to the advertisement actions supporting the active search for information about the product and not admitting the assessment of the competing products. Post-purchase evaluation of traditional products is in fact very common, so the possible change of the brand may cause a permanent change of buying habits.

Table 5. Results of estimation of model 3.

	Non-standardized coefficients		Standardized coefficients	<i>t</i> Statistic	<i>p</i> value
	β	Standard error	<i>Beta</i>		
const	-0,161	0,087		-1,844	0,066
Stage II Information Search	0,135	0,025	0,345	5,418	0,000
Stage III Evaluation of Alternatives	-0,037	0,011	-0,185	-3,443	0,001
Stage VI Post-purchase processes	0,044	0,018	0,134	2,440	0,015
Stage IV Decision Implementation	0,044	0,021	0,130	2,098	0,037

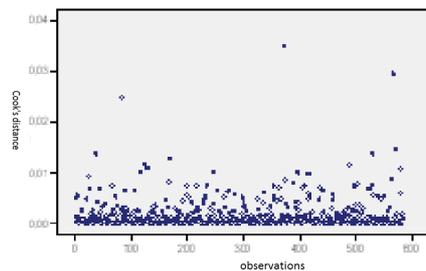
Source: own calculations

The relationship of advertising and decision-making process in the product market of new generation

The linear regression model (model 3.) presents the dependency between individual stages of the decision-making process and the increase of the advertisement effectiveness of the new generation products. The results of the estimation are shown in Table 5.

Model 3. explains more than 23% of the variable variance AIDA ($R^2 = 0,234$, $R_s^2 = 0,223$). The regression coefficients with all independent variables in the presented model are statistically important on the level of $p < 0,05$. With the additional diagnostics (figure 2), it allows to confirm the correctness of the model. The full analysis of the variance is shown in table 6. The value of the F -Snedecor statistics ($F_{4;270} = 20,664$) means the ability to reject the hypothesis about the zero value of the Beta coefficients ($H_0: \beta_1 = \beta_2 = 0$) with the significance $p = 7,17e-15$.

Figure 2. Residual analysis for model 3.



Source: own elaboration

Table 6. Analysis of variance of model 3 for the new generation products

	Sum of squares	<i>df</i>	mean square	<i>F</i> Statistics	<i>p</i> value
Regression	3,763	4	0,941	20,664	0,000
Rest	12,290	270	0,046		
Total	16,053	274			

Source: own calculations

Compared with model 1. (for all dairy products) the model limited to the new generation products (model 3.) is enriched with the stage of post-purchase processes. This stage is important from the advertisement effectiveness point of view. Based on the analysis of the model's coefficients it can be concluded that the relationship between searching for information, decision to purchase and post-purchase evaluation is positive, and the impacts on these stages are caused by the increase of the advertisement effectiveness. As the occurrence of choice of alternatives phase weakens the advertisement effectiveness (negative value of the coefficient with the variable), the aim of the advertisement's sender should be to urge the consumers to resign from this stage.

In case of new generation products, the decision-making process is more elongated than in case of traditional products (in model 3. it has an additional phase of the post-purchase evaluation). The results for this stage indicate that there is a need to communicate in the advertisement the post-purchase evaluation of the same brand, as the loyalty level on the new generation product market is lower than in

case of other dairy products. In addition, this stage is less stable – its level depends on the marketing communication.

Active actions encouraging consumers to reject the conscious analysis of brands and post-purchase evaluation may be based on the consumer's emotional attachment to the given brand. It is important to evoke in the advertisement the positive attitude and close relation of the consumer to the advertised product while using the recommended formation of the mood through music. In comparison with the model recommendation towards supporting the search for information and the purchase decision, it is worth noting that the nature of advertisement actions in this market should be more intense and multifaceted. This is made available by numerous recommended and advised advertisement measures, and perhaps also the non-standard forms of promotion which were not included in the study, and which may explain the additional part of the observed variation of the AIDA rate. As new generation products are more diverse, and as it results from the previously presented results, consumers approach their purchase more emotionally.

CONCLUSIONS

The need to differentiate the advertisement actions according to the product category in the dairy market was indirectly confirmed in the regression models. In case of traditional dairy products, it seems effective to conduct such advertising activities which encourage the consumer to actively search for information about the product, and at the same time weaken his or her need to compare the advertised product to others available on the market. Such actions appear to be more important than making the consumers aware of the need to purchase products or encouraging them to post-purchase evaluation. In addition to supporting consumers in their search for information and discouraging the analysis of the brands available on the market, it seems reasonable to strengthen the already existing loyalty post-purchase evaluation and inducing in the consumer the emotional attachment to the brand. Such activities allow to increase the effectiveness of advertising actions in case of products such as yoghurts or dairy desserts.

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