

A Model for the Evaluation of Radio Advertisements for the Sale of Timber Products

Model za ocjenjivanje radijskih oglasa o prodaji drvnih proizvoda

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ABSTRACT • Timber companies must continually strive to improve or at least maintain their market share. There are several methods to achieve this, and advertising is one of them. When timber companies make decisions about advertising, many of them choose radio advertising instead of television advertising, because it is less expensive. Companies should prepare advertisements that consumers will find attractive and appealing. To achieve this, they must take into account a number of criteria, as well as the fact that some of them are more important than the others. In this paper, the AHP analysis was used to determine the opinion of market professionals about the importance of criteria in radio advertising of timber products. Based on the results, a model for evaluating radio advertisements was developed and tested with random respondents, who evaluated a sample radio advertisement of timber companies.

Keywords: timber company, timber products, radio advertisement, AHP analysis, survey

SAŽETAK • Tvrtke za preradu drva moraju stalno nastojati poboljšati ili barem zadržati svoj tržišni udio. Postoji nekoliko načina da se to postigne, među kojima je i oglašavanje. Kad tvrtke za preradu drva odlučuju o oglašavanju, više će se njih odlučiti za radijsko nego za televizijsko oglašavanje, jer su radijski oglasi jeftiniji. Tvrtke trebaju pripremiti oglase koji će potrošačima biti atraktivni i koji će im se svidjeti. Stoga moraju uzeti u obzir niz kriterija, kao i činjenicu da su neki kriteriji važniji od drugih. U radu je primijenjena AHP analiza kako bi se utvrdilo mišljenje tržišnih profesionalaca o važnosti kriterija u radijskom oglašavanju drvnih proizvoda. Na temelju rezultata razvijen je model vrednovanja radijskih oglasa te je ispitan na slučajnom uzorku ispitanika koji su ocijenili uzorak radijskih oglasa tvrtki za preradu drva.

Glavne riječi: tvrtka za preradu drva, drvni proizvodi, radijski oglas, AHP analiza, anketa

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1 INTRODUCTION

1. UVOD

Advertising is the most important and widely used tool of the promotion mix. It is done through mass media such as television, radio, newspapers, magazines, commercial billboards, brochures, catalogues, leaflets, direct mail, email and other media (Jelačić et al., 2012). A company provides information on its products to consumers by means of advertisement in the most attractive way possible. Due to the impersonal form of marketing communication, the persuasiveness of advertising messages is of significant importance for consumers to decide whether they will actually buy the product (Oblak, 2012).

Advertising messages have impact on consumers' purchase decisions. The primary functions of advertising are (Cravens and Piercy, 2006):

- to present attractively the products offered by the company in the market,
- to direct hesitant buyers how to choose among a number of similar products,
- to influence and change established habits and customs in the use of products,
- to inform users about new products or technological achievements that improve current products,
- to create consumers positive attitude and confidence in a company and its products, and
- to indirectly influence the output growth and lowering costs due to increasing sales.

Advertising is used by companies to notify customers, convince them and form preferences for an individual product, trade mark or service and remind the customers where the product or service may be purchased.

Advertising expresses company's wish to maintain the current and acquire new consumers. Thus, its advertising activity is directed towards the current consumers, informing them about changes of the sales line, fashion news, prices, quality of the products or services, as well as to the potential new consumers, attempting to attract them not only for a one time purchase but to, instead, gain their lasting loyalty to the company.

A company has a number of options in choosing the advertising media. The biggest impact among all can be achieved with television, which combines pictures, sounds, colors and movement but this media is also very expensive. In addition, according to a survey by the Association of National Advertisers, 78 % of advertisers noted that TV advertising has become less effective during the past two years. Due to this, many timber companies choose radio advertising when they want to sell their products. When advertising on the radio, companies often choose local radio stations, especially small companies, because local radio stations provide much selectivity and elasticity of advertising at relatively low cost.

The objective of this paper was to define the importance of the individual evaluation criteria in radio advertising and to create a model for evaluating radio commercials of timber companies.

2 MATERIAL AND METHODS

2. MATERIJAL I METODE

2.1 AHP method

2.1. Metoda AHP

The AHP analysis is a widely used multi-criteria decision model for ranking alternatives or selecting the optimal alternative on the basis of a hierarchical tree structure of goal, criteria and sub-criteria. It has been used by many authors (Kitek Kuzman and Grošelj, 2012; Kitek Kuzman et al., 2013; Lipušček et al., 2010; Čančer and Mulej, 2010, 2013; Oblak et al., 2012; Paluš, 2005) as an aid in decision making.

The AHP (Analytic Hierarchy Process) analysis is one of the best known and most popular multiparameter decision-making methods. The components of multiparameter model are not included directly; the direct method of comparison by pairs is used instead. Weights in the AHP analysis are determined indirectly by comparing pairs of parameters, each to each.

The AHP analysis is based on pair-wise comparisons of the elements on the same level of the hierarchy in respect of the parent element on the higher level of hierarchy. Comparisons can combine measurable and non-measurable, tangible and intangible, quantitative and qualitative elements. The relative importance of pair-wise comparisons a_{ij} , $i, j = 1, \dots, n$ of elements i and j is evaluated on a scale from 1 to 9 (Table 1) and collected in the pair-wise comparison matrix $A = (a_{ij})_{n \times n}$. The inverse comparison is assigned a reciprocal value: $a_{ij} = 1/a_{ji}$.

The vector of weights $w = (w_1, \dots, w_n)$ belonging to the elements $i = 1, \dots, n$ can be derived from the pair-wise comparison matrix A by the eigenvector method (Saaty, 1980), where w is the eigenvector corresponding to the maximal eigenvalue of matrix A :

$$Aw = \lambda_{\max} w. \quad (1)$$

The inconsistency of matrix A can be measured by the consistency ratio $CR_A = CI_A / RI_n$, where consistency index $CI_A = \frac{\lambda_{A, \max} - n}{n - 1}$ depends on the maximal eigenvalue of matrix A and the maximal eigenvalue of consistent $n \times n$ matrix, which is n , and the random index RI_n , which depends on the size of the matrix A .

Matrix A is acceptably consistent if $CR_A < 0.1$. If A is not acceptably consistent there are two possibilities: the decision maker can revise his judgment or we can improve the consistency of the matrix A by the consistency improving method (Zeshui and Ciuping, 1999):

$$a_{ij}^* = (a_{ij})^\lambda \left(\frac{w_i}{w_j} \right)^{1-\lambda}, \quad (2)$$

where $0 < \lambda < 1$. If the adopted matrix $A^* = (a_{ij}^*)$ is still not acceptably consistent, we repeat the process of adoption.

The AHP analysis offers many suitable methods for the aggregation of individual results into a group result. In this research, the WGMDEA method was selected (Grošelj et al., 2011). The method is based on

Table 1 Scale of importance levels and preferences of the AHP method (Saaty, 2006)

Tablica 1. Ljestvica razine važnosti i preferencija metode AHP

Numerically expressed level / Brojčano izražena razina	Verbally expressed level / Opisno izražena razina
1	Both criteria are equally important, the alternatives are equally desirable. / Oba su kriterija jednako važna, alternative su jednako poželjne.
3	The criterion is moderately more important than the comparable criterion; we gave a moderate priority to the alternative. / Kriterij je umjereno važniji od usporedivih kriterija; dali smo umjereni prioritet alternativni.
5	The criterion is strongly more important than the comparable criterion; we gave a strong priority to the alternative. / Kriterij je mnogo važniji od usporedivih kriterija; dali smo velik prioritet alternativni.
7	The criterion is very strongly more important than the comparable criterion; we gave a very strong priority to the alternative. / Kriterij ima znatno veću važnost od usporedivih kriterija; dali smo vrlo veliku prednost alternativni.
9	The criterion is extremely more important than the comparable criterion; we gave an extreme priority to the alternative. / Kriterij je izuzetno važniji od usporedivih kriterija; dali smo iznimnu prednost alternativni.
2, 4, 6, 8	The middle values / Srednje vrijednosti

linear programming and has foundations in the Data Envelopment Analysis.

Let $a_{ij}^{(k)}$, $i, j=1, \dots, n$, $k=1, \dots, m$ be pair-wise comparisons of m decision makers. Let opinions of all decision makers be equally important. Solving linear programs for all w_p , $i=1, \dots, n$, provides n group priorities.

$$\begin{aligned}
 \max \quad & w_0 = \sum_{j=1}^n \sqrt[m]{\prod_{k=1}^m a_{0j}^{(k)}} x_j \\
 \text{subject to} \quad & \sum_{j=1}^n \left(\sum_{i=1}^n \sqrt[m]{\prod_{k=1}^m a_{ij}^{(k)}} \right) x_j = 1 \\
 & \sum_{j=1}^n \sqrt[m]{\prod_{k=1}^m a_{ij}^{(k)}} x_j \geq nx_i, \quad i = 1, \dots, n \\
 & x_j \geq 0, \quad j = 1, \dots, n.
 \end{aligned} \tag{3}$$

The maximum values of linear programs w_i , $i=1, \dots, n$ provide group vector of weights $w=(w_1, \dots, w_n)$.

2.2 Survey

2.2. Anketa

A survey is a method of data collection, which enables to get data about the views and opinions of respondents. It is economically convenient since by means of a properly formatted survey a large number of information can be attained in a short time. Survey questions can be divided into two categories: open and closed questions. As regards open questions, respondents answer in their own words, and regarding closed questions, respondent are to choose one of the answers offered next to each question.

2.3. Model formulation and testing

2.3. Formuliranje i testiranje modela

Among the project criteria by which consumers memorize radio advertisements, the most important were determined. Several criteria were used and therefore it was necessary to determine the most important ones. The comparison had to be made in pairs, whereby the number of required comparisons was growing rapidly with the number of criteria. Based on the re-

sults of the expert group, which were obtained by means of the AHP method, the criteria were defined according to their importance. The expert group was made of five experts from different fields: wood science and technology, economics and advertising design. They assessed general advertising attributes. The results were used to formulate the model enabling evaluation of likeability of radio commercials. The model was tested; 15 respondents assessed a specific radio commercial of a timber company. To test the model, a sample size is large enough.

3 RESULTS AND DISCUSSION

3. REZULTATI I RASPRAVA

3.1 Results of the AHP method

3.1. Rezultati metode AHP

Advertising experts have defined four parameters, which in their opinion had the greatest impact on consumers' emotions in perception of radio advertisements. Using the AHP method for the evaluation, the parameters were compared to each other, each by each. Analysis provided identification of the importance of certain criteria for each assessor. After reviewing all the evaluated criteria, all their values were obtained, distributed proportionally. The resulting data, obtained with the help of the expert group, were analyzed using the computer program Expert Choice™.

Experts evaluated the following parameters:

1. voice (easy to listen to, clarity, dynamics of narration),
2. background sound (music, effects...),
3. content of the advertisement,
4. duration of the advertisement.

The AHP method comprised the nine digit evaluation scale, i.e. one parameter on each side of the line, which is subject to a value assigned according to our impression. Pairs of advertising parameters were compared on a scale from 1 to 9, focusing on whether any of these parameters were more important than the others, and on the difference in the importance between them. The value was assigned to only one parameter.

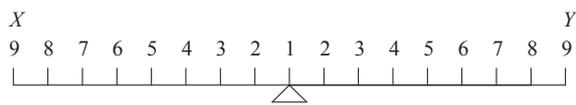


Figure 1 Comparative scale of the AHP method
Slika 1. Komparativna ljestvica metode AHP

The parameters were compared by the members of an expert group with the use of AHP method. Figure 2 shows a questionnaire, which was filled to compare the parameters of a radio advertisement.

After executing an inter-comparison of the parameters by means of a mathematical matrix or a computer program, for instance Expert ChoiceTM, the AHP method was carried out. The analysis indicates which evaluated parameter had the greatest weight in the evaluation of radio advertisements.

Table 2 shows the results of the AHP method for radio advertisements by experts.

Table 2 demonstrates that the content of the advertisement had considerably more weight than the other parameters. The voice, or how easy was to listen to something and how clear and dynamic the narration was, was the second in terms of importance, followed by the duration of the advertisement. The background sounds were, in the opinion of the experts, the least important criterion.

3.2 Survey results
3.2. Rezultati ankete

The objective of the survey was to evaluate a specific radio advertisement. Fifteen randomly chosen people, aged from 18 to 65, viewed a radio advertisement of furniture sale of a Slovenian timber company. The respondents were asked to evaluate individual cri-

voice (easy to listen to, clarity, dynamics of narration...)	9 8 7 6 5 4 3 2 1 2 3 4 5 6 7 8 9	background sound (music, effects...)
voice (easy to listen to, clarity, dynamics of narration...)	9 8 7 6 5 4 3 2 1 2 3 4 5 6 7 8 9	content of the advertisement
voice (easy to listen to, clarity, dynamics of narration...)	9 8 7 6 5 4 3 2 1 2 3 4 5 6 7 8 9	duration of the advertisement
background sound (music, effects...)	9 8 7 6 5 4 3 2 1 2 3 4 5 6 7 8 9	content of the advertisement
background sound (music, effects...)	9 8 7 6 5 4 3 2 1 2 3 4 5 6 7 8 9	duration of the advertisement
content of the advertisement	9 8 7 6 5 4 3 2 1 2 3 4 5 6 7 8 9	duration of the advertisement

Figure 2 Survey AHP questionnaire for a radio advertisement
Slika 2. Anketni AHP upitnik za radijsko oglašavanje

Table 2 Average of the results obtained with the AHP method for radio advertisements

Tablica 2. Prosječni rezultati dobiveni metodom AHP za radijsko oglašavanje

Parameter <i>Parametar</i>	Person / <i>Osoba</i>					Sum <i>Zbroj</i>	Average <i>Prosječno</i>
	A	B	C	D	E		
Content of the advertisement / <i>Sadržaj oglasa</i>	0.664	0.249	0.424	0.615	0.601	2.553	0.5106
Voice / <i>Glas</i>	0.208	0.592	0.231	0.208	0.251	1.49	0.2980
Duration of the advertisement / <i>Trajanje oglasa</i>	0.064	0.054	0.285	0.072	0.094	0.569	0.1138
Background sound / <i>Zvuk u pozadini</i>	0.064	0.105	0.06	0.105	0.054	0.388	0.0776

Table 3 Survey results

Tablica 3. Rezultati ankete

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Total <i>Ukupno</i>	Average <i>Prosječno</i>
Content of the advertisement <i>Sadržaj oglasa</i>	5	5	4	4	5	5	4	2	3	2	5	2	2	4	5	57	3.800
Voice / <i>Glas</i>	5	2	4	4	4	4	5	3	4	4	5	3	3	4	5	59	3.933
Duration of the advertisement <i>Trajanje oglasa</i>	4	4	4	3	4	2	3	5	3	2	3	3	3	5	5	53	3.533
Background sound <i>Zvuk u pozadini</i>	4	1	3	3	2	4	4	4	2	2	4	2	2	5	5	47	3.133

Table 4 Evaluation of television advertisement with the model

Tablica 4. Ocjena televizijskog oglašavanja primjenom modela

Parameter <i>Parametar</i>	Average rating <i>Prosječna ocjena</i>		Weight <i>Važnost</i>		Result <i>Rezultat</i>
	3.800	x	0.5106	=	1.9403
Content of the advertisement / <i>Sadržaj oglasa</i>	3.933	x	0.2980	=	1.1720
Voice / <i>Glas</i>	3.533	x	0.1138	=	0.4021
Duration of the advertisement / <i>Trajanje oglasa</i>	3.133	x	0.0776	=	0.2431
			Σ = 1		3.7575

teria with values ranging from 1 to 5 (1 = lowest rating, 5 = highest rating). The results of the survey of radio advertisement are the values shown in Table 3.

The average value of individual evaluations was calculated and multiplied with the weight of the criteria.

The potential buyers assessed the radio advertisement with an average of 3.7575. The highest possible score was 5.

4 CONCLUSION 4. ZAKLJUČAK

Nowadays, consumers are very demanding and they require as much as possible information about the product to be sure about its quality. Television advertisements represent the most effective way to provide information about the product to a wide audience by combining pictures, sounds, colors and movement, but it is very expensive. An increasing number of timber companies, therefore, rather decided to use radio advertising. When creating an advertisement, experts' opinions, as well as the opinion of the consumers, should be taken into account.

In our project, the method called Analytic Hierarchy Process (AHP) was used. The method represents a strong and flexible decision making technique, which helps in setting priorities and reaching optimal decisions in situations when quantitative and qualitative aspects have already been taken into consideration. It is based on the comparison of pairs of alternative solu-

tions, during which all alternatives are compared to one another, and the decision maker can express the intensity and level of preference towards one alternative in relation to the other according to the criteria he finds important. In the same way, criteria can be compared according to our own preferences and their intensity.

By means of the AHP method, the importance of individual weights was determined, as well as the criteria by which consumers assess radio advertisements. The content and the idea of an advertisement were found as the most important factors, followed by voice (easy to listen to, clarity, dynamics of narration), duration of the advertisement and background sound (music, effects...). A model enabling the evaluation of these types of advertisements was elaborated. The model was tested in a survey, whereby random potential buyers evaluated a radio advertisement of a Slovenian timber company.

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