

Prioritization of the Advertising Activities of Tehran Stock Exchange Investment Companies Based on Investors' Financial Literacy Using Step-by-Step ANP Approach

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P A P E R I N F O	A B S T R A C T
<p>Chronicle: Received: 29 September 2017 Accepted: 17 January 2018</p>	<p>Understanding financial literacy and knowing the financial skills that an investor can invest in Tehran Stock Exchange are very important in order to reduce investor's concerns and worries. Hence, investment companies that invest on behalf of their stockholders can reduce these concerns and worries. Therefore, the advertising activities of these companies are important in attracting investors, as well as providing company activities, etc. In this paper, the appropriate criteria and desired advertising activities that are obtained by financial literacy for investment companies, which are invested in Tehran Stock Exchange, are outlined. These advertising activities are ranked by using the step-by-step approach of analytic network process which is a multi-criteria decision-making method. According to its results, advertising activities using TV has the most weight among other advertising activities. This indicates that the use of television for advertising in company investments in Tehran Stock Exchange will be very influential. Also, social networks are ranked second, and in the end, two activities of billboards and magazines with a very small difference are placed in the fifth and sixth rankings. These two advertising activities have less effect than other ones in Tehran Stock Exchange investment companies.</p>
<p>Keywords: Advertising Activities. Tehran Stock Exchange Investment. Literacy. Network Analysis Process.</p>	

1. Introduction

Today, it is no secret to anyone that investment in the stock market is fraught with specific complexities and difficulties. Therefore, the individuals who are willing to invest in the stock market will be dissatisfied with the investment outcome if they are not able to manage their own financial resources properly. In the meantime, the individuals with a low financial literacy will be disappointed. These types of people cannot make the right decisions about their own financial resources. In the definition of financial literacy, it can include concepts, such as financial knowledge, science, and knowledge about financial products and financial institutions, or such concepts as financial skills, which include the ability to calculate compound interest and, in general, the financial ability for monetary management and financial planning. These concepts are overlapping and common with each other in practice [1].

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It is not possible to achieve any goal without proper knowledge and understanding. In investment, everything begins with knowledge and information. When one embarks on the conduct of a financial affair, such as investment in capital markets with more financial information, s/he will be likely to come up with better and more informed outcomes and results. In fact, the enjoyment of financial literacy is the best and most powerful instrument for securing investment and reducing the risks. In today's modern world, it is impossible to reach success in investment without the ability to perceive the financial affairs and without the knowledge of the alphabet of economics and finance, and without financial literacy. Financial literacy is a broad concept that includes individuals' information and behavior for the enjoyment of a secure future financial position. This concept primarily involves the empowerment and training of individuals and communities against financial issues, so that they can embark on the assessment of markets and products and informed decision-making [2].

As it was mentioned above, investors will face complexities and difficulties in entering the capital market and the stock market. Hence, the specialized stock exchanges are among the investment companies with unique investment opportunities. In fact, these companies can tackle the lack of financial literacy among investors. These companies are financial intermediaries and provide their funds from a shareholder or depositor (banks). In accordance with the American Financial Institutions Act, adopted in 1940, the main activities of these companies include investment, re-investment, ownership, holding or trading of securities in the framework of laws and regulations [3]. Therefore, these companies invest in the stock market in order to gain profit from market fluctuations, and these companies do not become the owner of their subsidiaries. In fact, if these companies are faced with a decline in stock prices, they will sell the shares of companies; on the other hand, in the event that the investment companies earn a profit, they will purchase the shares of companies. Therefore, if investors want to invest based on financial literacy and are ultimately not dissatisfied with the outcome of the investment, it will be possible to offer the investment companies that merit the special potential for investment in Tehran Stock Exchange.

Advertising is one of the well-known marketing tools for the expansion of penetration in the market and is an important factor in product consumption that has been linked with concepts, such as communication, competition, customer satisfaction, and so on. Advertising activities, as an element of marketing, plays a pivotal role in the preservation and survival of the organizations via the introduction of products [4]. Media are the most common form of advertising wherein advertising is a tool through which the products are distinguished from each other; the informational relation between products is established; the consumer is obliged to the reuse of the products in order to reach such objectives as the stimulation of product distribution, the increase of product use, value construction, excellence of the commercial brand, and reduction of overall advertising costs [5]. Indeed, the advertisement is a key pillar in every organization or company for the creation of awareness of products and services for consumers. For this reason, all organizations or companies should recognize and rank the advertising media that can help with the stimulation of the market. In order to rank the advertising activities of the investment companies in Tehran Stock Exchange, it should identify the appropriate criteria based on the investors' financial literacy and the criteria, which are effective in ranking the advertising activities. Then, using the step-by-step approach, the network analysis weighs these activities, and advertising activities are prioritized by comparing them.

The word of ANP means the analytical network process. Because the criteria in the real world are usually interdependent, the traditional approaches in this regard can not be appropriately applied. That is why Thomas Al-e-Saati introduced the analytical network process that developed by the hierarchical analysis process to obtain a set of appropriate weights for the criteria [6]. The network analytical step-

by-step approach with matrix multiplication method will obtain the appropriate answer for the problem. In order to determine the interdependence between options in this method, the influence of options on each other is calculated based on each criterion. This method helps the researcher to consider all dependencies between criteria and options to solve the problem. Newspapers, magazines, e-mail, radio, television, billboards, etc. are among the alternatives or the media that executive and financial managers can use them to promote the activities of investment companies. In these media, it is possible to consider such criteria as the type of target consumer, the type of media, media access, availability, effectiveness, the relationship between advertising costs of the media, and the impact of advertising campaigns on products [7].

Of course, the managers who use the advertising tools and media are not deeply aware of the issues related to advertising, and their activities in this area are completely empirical and based on trial and error, unfortunately, they take no scientific and measurable approach to their advertising activities. However, factors such as age, gender, education, level of familiarity with the Internet, etc. influence the behavior of users, customers, investors, and so on [4]. Hence, given this fact that these companies do not have a deep understanding of the advertising issues, and the fund allocation of advertising in these companies is a major constraint, it is of high importance to use the advertising media wherein selection and decision-making are on the basis of financial literacy, and the best advertisement can get operative in line with the financial resources.

The present study seeks to describe the dimensions of financial literacy and introduce the characteristics of investment in the investment companies of Tehran Stock Exchange so that investors can do activity in the stock market in a way that they can be finally satisfied with their investment. This will lead to a state in which the advertising activities of the investment companies in the capital market assume great importance. Using the step-by-step approach of analytic network process, which is among Multi-Criteria Decision-Making Techniques (MCDM), a right combination of advertising activities is prioritized for the investment companies in Tehran Stock Exchange based on financial literacy and a satisfactory solution is also proposed.

2. Literature Review

Research in the field of advertising activities mainly includes the planning of advertising media for single-product or multi-product products, the impact of social media on stock exchanges, the cyclical impact of advertising on organizations and institutions, or the measurement of the amount of advertising engagement in companies. Also, major research on financial literacy has included the impact of financial literacy on small and large businesses, the relationship between financial disparities and financial literacy, the urgent need to understand financial literacy on society and the impact of financial literacy on households.

Jha et al. [7] also examined the effect of using the advertising media on a wide range of multi-product items and found advertising to be effective in increased access to all sectors. In this research, the problem is solved by using ideal planning, and the study of advertising media is not based on financial literacy [7]. Mihalčová et al. [8] considered financial literacy to be a key element in decision-making in all areas of life, and stated that financial literacy is an urgent need for human society and he referred to media literacy as one of its examples, but he did not specify criteria for advertising media based on financial literacy. Dorminey et al. [9] examined the use of social media and its effect on the dissemination of information and concluded that it leads to the spread of market profits and stock widespread in the stock exchange. Of course, it is not pointed out to any effective activity in advertising

in this research [9]. Shen et al. [10] concluded with the design of two special sections of the financial literacy survey that was conducted under the supervision of the National Commission on Financial Services of Taiwan in which people with more financial literacy are less likely to experience financial disputes. Research only examined the relationship between financial disparities and financial literacy [10].

Anderson et al. [11] evaluated financial literacy among LinkedIn members using questions and concluded that respondents with low financial literacy have a false impression of financial products and have less willingness to receive financial advice. In this research, it deals merely with preventive savings and retirement planning from the financial literacy category [11]. Maryam Jafar Tehrani [4] reviewed the Internet-based advertising tools and examined the statistical population of website managers and users through the questionnaire. They concluded that the Internet users' prioritizations are different from advertising tools based on various factors, and their ranking is not the same as the Internet-based advertising tools. In this study, it only emphasizes on the internet advertising, and there is not enough documentation because of the fact that the industry in Iran is new [4]. Mojtaba Sedghi [12] examined the effect of tolerable growth on the relationship of the advertising cost and Research and Development cost with systematic and non-systematic risk. He concluded that the ratios of advertising and Research and Development costs to sales had a significant negative relationship with systematic and non-systematic risk. Of course, in this research, the cost of advertising of those companies, which were accepted in Tehran Stock Exchange has been considered, and ranking of these activities was not paid attention to [12]. From 2012-2013, Mehdipour assessed the impact of advertising on increasing the knowledge of the consumers of the National Oil Company about three products, including gasoline, motor oil, and industrial oils in Mazandaran province and concluded that all promotional and advertising methods had been effective in increasing the knowledge of the consumers of this company in Mazandaran Province. Of course, in this research, advertising rating has not been made based on financial literacy [13]. In a paper entitled "*Investigating the Effect of Investors' Financial Literacy on Investment Decision-Making in Securities*", Moradi [14] reported that the four factors: including individual mentality, accounting information, economic information, and personal financial needs have an impact on investors' decision-making in Iran. Of course, this research has targeted financial literacy of stock investors and has not focused on prioritizing advertising activities [14].

To the best of the researchers' knowledge, this research is one of the first studies in which the prioritization of advertising activities is based on the financial literacy of investors and this subject has been examined using analytic network process. In the reviewed articles, either the subject of advertising had been touched upon or financial literacy had been merely addressed. However, the present study is an attempt to assess the investors' satisfaction with their investment in the investing companies of Tehran Stock Exchange with regard to the concept of financial literacy by describing the dimensions of financial literacy as well as the characteristics of investment in Tehran Stock Exchange companies. Accordingly, based on above-mentioned points, the investment companies' advertising and the manner of prioritizing their advertising activities will be very important. In the above articles, the Analytic Hierarchy Process (AHP method) has been primarily used for the prioritization; however, the current research has employed analytic network process for the prioritization of the promotional and advertising activities of investment companies. One of the distinct features of this method is that it considers the internal relations between the criteria and sub-criteria. Ultimately, given the results that are presented in this study, it is hoped that the investment companies can benefit from the best advertising that considers the available resources.

3. Research Method

In this research, the step-by-step approach of analytic network process (one of the Multi-Criteria Decision-Making techniques (MCDMs)) has been used, and the steps of this method are divided into two main parts. In the first part, the problem criteria will be ranked and in the second part, the problem alternatives will be ranked. This method consists of 5 steps and the problem criteria will be ranked according to the results of the first and second steps of the problem. This approach does not solve the problem by forming a super matrix, but the suitable answer for the problem will be obtained via matrix multiplication.

In the analytic network process method, the influence of alternatives on each other is calculated based on each criterion in order to determine the interdependence between the alternatives. This method helps the researcher to consider all dependencies between the criteria and alternatives to solve the problem [15-17]. The steps of this method are as follows:

- Determination of the importance of criteria in relation to the purpose of the problem.
- The pairwise comparison between the criteria based on each criterion.
- The pairwise comparison of projects with regard to criteria.
- The pairwise comparison between self-promotional activities.
- Determination of the prioritization of the promotional and advertising activities.

Statistical population: All the active experts in the field of stock market and advertising activities in Tehran constitute the statistical population of this research.

Statistical sample: In this research, there is no statistical sample and sampling is not conducted. Indeed, only three experts in the field of stock and advertising activities are used to complete the questionnaire.

Validity of the questionnaire: In this research, the skilled experts in the stock market and promotional and advertising activities consult to assess the validity of the questionnaire. The results confirm the validity of the questionnaire.

Investing in the stock has many advantages, and the use of financial literacy in investments makes it possible to have a better and more secure investment, which will be better realized in stock investment companies. Also, according to this fact that advertising has not been ranked based on financial literacy in past research, the ranking of advertising activities of investment companies in Tehran Stock Exchange will be considered based on financial literacy by using the network analysis process method and using the step-by-step approach that considers the internal relations of criteria and sub-criteria well.

4. Results and findings

4.1. Advertising Activities and Their Criteria for Ranking

According to the carried out studies and the analysis of previous projects, the activities of the Tehran Stock Exchange investment companies can be summarized as follows based on the financial literacy of the investors as well as the required criteria in order to measure these activities. In this project, 6 advertising activities are used as the alternatives in the step-by-step approach of analytic network process. These activities include (1. Newspapers, (2. Magazines, (3. Radio, (4. Television, (5. Billboards, and (6. Social networks.

In addition, for the measurement of these alternatives, seven criteria have been used as follows:

- Type of target consumers: Based on the intended purpose, what type of consumer uses these advertising activities.
- Type of media: The type of media is important in the selection of advertising activities in terms of being known or unknown.
- Media access: This means how the access to media is depending on the region where we are.
- Availability: In order to carry out advertising activities, which media is easier to use?
- Effectiveness: Which media is more influential in people and more effective in advertising?
- The relationship between the advertising costs of media: In advertising, how will be the relationship between advertising costs.
- The effect of advertising and promotional campaigns on products: Which campaigns are most affected by what types of products?

Step one: Determination of the importance of criteria in relation to the purpose of the problem

For the resolution of the problem and prioritization of the advertising activities of Tehran Stock Exchange Investment Companies and for resource allocation, the importance of criteria in relation to the problem objectives is specified in the first step through the expert opinion by means of the step-by-step approach. The primary importance of the criteria regarding the purpose of the problem through the lens of the experts is as follows:

Table 1. The importance of the experts' criteria in relation to the problem goal.

The impact of advertising campaigns	Advertising costs of the media	Effectiveness	Availability	Media access	Type of media	Type of consumer
5.05	6.75	13.9	9.6	13	16.8	12.5

Then, these numbers are normalized where the results of the normalized importance of the criteria relative to the objective of the problem are as follows:

Table 2. Weights of criteria relative to the problem objective.

Criteria	Type of consumer	Type of media	Media access	Availability	Effectiveness	Advertising costs of the media	The impact of advertising campaigns
W1	0.161	0.216	0.168	0.124	0.179	0.087	0.065

Step two: The pairwise comparison between the criteria based on each criterion

In the second step, the importance of the criteria will be determined according to the interdependence of the criteria. In fact, the importance of the criteria is calculated with respect to the interdependence between the criteria. The weights of each criterion are shown in the following table:

Table 3. The interdependence of criteria according to the criterion of consumer type.

	Type of consumer	Type of media	Media access	Availability	Effectiveness	The relationship between costs	The impact of advertising campaigns	Geometric mean	Weights of criteria W2
Type of consumer	1.00	3.00	1.00	0.33	3.00	1.00	3.00	1.37	0.19
Type of media	0.33	1.00	0.33	5.00	3.00	5.00	3.00	1.58	0.22
Media access	1.00	3.00	1.00	1.00	0.20	3.00	0.33	0.93	0.13
Availability	3.00	0.20	1.00	1.00	3.00	0.33	5.00	1.17	0.16
Effectiveness	0.33	0.33	5.00	0.33	1.00	0.33	3.00	0.79	0.11
The relationship between costs	1.00	0.20	0.33	3.00	3.00	1.00	1.00	0.93	0.13
The impact of advertising campaigns	0.33	0.33	3.00	0.20	0.33	1.00	1.00	0.58	0.08

Table 4. The interdependence of criteria according to the criterion of media type.

	Type of consumer	Type of media	Media access	Availability	Effectiveness	The relationship between costs	The impact of advertising campaigns	Geometric mean	Weights of criteria W2
Type of consumer	1.00	0.20	3.00	1.00	5.00	1.00	3.00	1.37	0.17
Type of media	5.00	1.00	3.00	5.00	3.00	1.00	5.00	2.73	0.33
Media access	0.33	0.33	1.00	1.00	0.33	1.00	3.00	0.73	0.09
Availability	1.00	0.20	1.00	1.00	3.00	0.33	1.00	0.79	0.10
Effectiveness	0.20	0.33	3.00	0.33	1.00	3.00	5.00	1.00	0.12
The relationship between costs	1.00	1.00	1.00	3.00	0.33	1.00	3.00	1.17	0.14
The impact of advertising campaigns	0.33	0.20	0.33	1.00	0.20	0.33	1.00	0.39	0.05

Table 5. The interdependence of criteria according to the criterion of media access.

	Type of consumer	Type of media	Media access	Availability	Effectiveness	The relationship between costs	The impact of advertising campaigns	Geometric mean	Weights of criteria W2
Type of consumer	1.00	3.00	3.00	5.00	1.00	0.33	7.00	1.94	0.26
Type of media	0.33	1.00	0.33	1.00	1.00	5.00	3.00	1.08	0.14
Media access	0.33	3.00	1.00	3.00	5.00	1.00	0.33	1.26	0.17
Availability	0.20	1.00	0.33	1.00	5.00	1.00	3.00	1.00	0.13
Effectiveness	1.00	1.00	0.20	0.20	1.00	3.00	0.33	0.63	0.08
The relationship between costs	3.00	0.20	1.00	1.00	0.33	1.00	0.20	0.63	0.08
The impact of advertising campaigns	0.14	0.33	3.00	0.33	3.00	5.00	1.00	0.95	0.13

Table 6. The interdependence of criteria according to the criterion of availability.

	Type of consumer	Type of media	Media access	Availability	Effectiveness	The relationship between costs	The impact of advertising campaigns	Geometric mean	Weights of criteria W2
Type of consumer	1.00	3.00	0.33	3.00	3.00	1.00	5.00	1.72	0.33
Type of media	0.33	1.00	1.00	1.00	3.00	3.00	1.00	1.17	0.16
Media access	3.00	1.00	1.00	0.33	1.00	3.00	0.20	0.93	0.12
Availability	0.33	1.00	3.00	1.00	3.00	1.00	5.00	1.47	0.20
Effectiveness	0.33	0.33	1.00	0.33	1.00	3.00	1.00	0.73	0.10
The relationship between costs	1.00	0.33	0.33	1.00	0.33	1.00	0.33	0.53	0.07
The impact of advertising campaigns	0.20	1.00	5.00	0.20	1.00	3.00	1.00	0.93	0.12

Table 7. The interdependence of criteria according to the criterion of effectiveness.

	Type of consumer	Type of media	Media access	Availability	Effectiveness	The relationship between costs	The impact of advertising campaigns	Geometric mean	Weights of criteria W2
Type of consumer	1.00	3.00	1.00	1.00	0.33	5.00	3.00	1.47	0.19
Type of media	0.33	1.00	1.00	3.00	1.00	5.00	3.00	1.47	0.19
Media access	1.00	1.00	1.00	3.00	0.20	0.33	1.00	0.79	0.10
Availability	1.00	0.33	0.33	1.00	1.00	0.20	1.00	0.58	0.07
Effectiveness	3.00	1.00	5.00	1.00	1.00	3.00	3.00	2.02	0.26
The relationship between costs	0.20	0.20	3.00	5.00	0.33	1.00	1.00	0.79	0.10
The impact of advertising campaigns	0.33	0.33	1.00	1.00	0.33	1.00	1.00	0.62	0.08

Table 8. The interdependence of criteria according to the criterion of the relationship between costs.

	Type of consumer	Type of media	Media access	Availability	Effectiveness	The relationship between costs	The impact of advertising campaigns	Geometric mean	Weights of criteria W2
Type of consumer	1.00	3.00	5.00	1.00	3.00	1.00	5.00	2.17	0.28
Type of media	0.33	1.00	5.00	3.00	1.00	0.33	3.00	1.26	0.16
Media access	0.20	0.20	1.00	1.00	0.33	1.00	1.00	0.54	0.07
Availability	1.00	0.33	1.00	1.00	3.00	0.20	0.33	0.68	0.09
Effectiveness	0.33	1.00	3.00	0.33	1.00	0.33	5.00	0.92	0.12
The relationship between costs	1.00	3.00	1.00	5.00	3.00	1.00	0.33	1.47	0.19
The impact of advertising campaigns	0.20	0.33	1.00	3.00	0.20	3.00	1.00	0.74	0.09

Table 9. The interdependence of criteria according to the criterion of impact of advertising campaigns.

	Type of consumer	Type of media	Media access	Availability	Effectiveness	The relationship between costs	The impact of advertising campaigns	Geometric mean	Weights of criteria W2
Type of consumer	1.00	3.00	1.00	1.00	1.00	1.00	1.00	1.17	0.16
Type of media	0.33	1.00	3.00	1.00	5.00	1.00	3.00	1.47	0.20
Media access	1.00	0.33	1.00	1.00	3.00	3.00	3.00	1.37	0.19
Availability	1.00	1.00	1.00	1.00	1.00	1.00	0.20	0.79	0.11
Effectiveness	1.00	0.20	0.33	1.00	1.00	0.33	1.00	0.58	0.08
The relationship between costs	1.00	1.00	0.33	1.00	3.00	1.00	0.33	0.85	0.12
The impact of advertising campaigns	1.00	0.33	0.33	5.00	1.00	3.00	1.00	1.08	0.15

The final preference can be calculated for each criterion at the end of these two steps. After the pairwise comparison of the criteria relative to each other, the *W2* matrix is formed with the weights that are obtained for each criterion and calculates as a result of the pairwise comparisons.

Then, the W_2 matrix will be multiplied by the W_1 matrix to determine the final preference of the criteria for the problem of appropriate project selection and resource allocation. To this end, each row of W_2 will be multiplied by the columnar matrix of W_1 .

$$W_C = W_1 \times W_2 = \begin{matrix} 0.19 & 0.17 & 0.26 & 0.23 & 0.19 & 0.28 & 0.16 & 0.161 & 0.2068 \\ 0.22 & 0.33 & 0.14 & 0.16 & 0.19 & 0.16 & 0.20 & 0.216 & 0.2113 \\ 0.13 & 0.09 & 0.17 & 0.12 & 0.10 & 0.07 & 0.19 & 0.168 & 0.1198 \\ 0.16 & 0.10 & 0.13 & 0.20 & 0.07 & 0.09 & 0.11 & 0.124 & 0.1215 \\ 0.11 & 0.12 & 0.08 & 0.10 & 0.26 & 0.12 & 0.08 & 0.179 & 0.1318 \\ 0.13 & 0.14 & 0.08 & 0.07 & 0.10 & 0.19 & 0.12 & 0.087 & 0.1166 \\ 0.08 & 0.05 & 0.13 & 0.12 & 0.08 & 0.09 & 0.15 & 0.065 & 0.0921 \end{matrix}$$

The W_C matrix indicates the ultimate preference of the criteria for the prioritization of advertising activities.

Step three: The pairwise comparison of projects with regard to criteria

After ranking the criteria, it is time that the advertising activities are ranked. To determine the importance of these activities by means of the step-by-step approach of analytic network process, the projects will be first compared according to each criterion.

Table 10. The importance of advertising activities relative to the criteria.

	Type of consumer	Type of media	Media access	Availability	Effectiveness	The relationship between costs	The impact of advertising campaigns
Newspapers	5.00	3.00	1.00	3.00	5.00	7.00	5.00
Magazines	5.00	7.00	3.00	5.00	5.00	1.00	3.00
Radio	7.00	3.00	3.00	1.00	3.00	5.00	3.00
Television	7.00	3.00	5.00	5.00	1.00	3.00	7.00
Billboards	3.00	5.00	5.00	7.00	3.00	3.00	1.00
Social networks	5.00	3.00	7.00	5.00	3.00	1.00	5.00

Table 11. The normalized importance of advertising activities relative to the criteria.

	Type of consumer	Type of media	Media access	Availability	Effectiveness	The relationship between costs	The impact of advertising campaigns
Newspapers	0.16	0.13	0.04	0.12	0.25	0.35	0.21
Magazines	0.16	0.29	0.13	0.19	0.25	0.05	0.13
Radio	0.22	0.13	0.13	0.04	0.15	0.25	0.13
Television	0.22	0.13	0.21	0.19	0.05	0.15	0.29
Billboards	0.09	0.21	0.21	0.27	0.15	0.15	0.04
Social networks	0.16	0.13	0.29	0.19	0.15	0.05	0.21

Step four: The pairwise comparison between self-promotional activities

In this step, advertising activities are compared with each other, and the weight of advertising activities will be achieved relative to each other according to the following tables:

Table 12. The interdependence of the criteria according to the criterion of consumer type.

	Newspapers	Magazines	Radio	Television	Billboards	Social networks
Newspapers	1.00	1.00	3.00	0.33	0.33	1.00
Magazines	1.00	1.00	0.33	5.00	3.00	1.00
Radio	0.33	3.00	1.00	0.33	1.00	0.33
Television	3.00	5.00	3.00	1.00	3.00	1.00
Billboards	3.00	0.33	1.00	0.33	1.00	0.33
Social networks	1.00	1.00	3.00	1.00	3.00	1.00

Table 13. The interdependence of the criteria according to the criterion of media type.

	Newspapers	Magazines	Radio	Television	Billboards	Social networks
Newspapers	1.00	1.00	3.00	0.20	0.33	1.00
Magazines	1.00	1.00	0.33	1.00	0.33	0.20
Radio	0.33	3.00	1.00	0.33	3.00	1.00
Television	5.00	1.00	3.00	1.00	5.00	3.00
Billboards	3.00	3.00	0.33	0.20	1.00	0.33
Social networks	1.00	5.00	1.00	0.33	3.00	1.00

Table 14. The interdependence of the criteria according to the criterion of media access.

	Newspapers	Magazines	Radio	Television	Billboards	Social networks
Newspapers	1.00	0.33	3.00	1.00	0.33	1.00
Magazines	3.00	1.00	0.33	0.33	1.00	0.20
Radio	0.33	3.00	1.00	1.00	0.33	3.00
Television	1.00	3.00	1.00	1.00	3.00	5.00
Billboards	3.00	1.00	3.00	0.33	1.00	0.33
Social networks	1.00	5.00	0.33	0.20	3.00	1.00

Table 15. The interdependence of the criteria according to the criterion of availability.

	Newspapers	Magazines	Radio	Television	Billboards	Social networks
Newspapers	1.00	3.00	1.00	0.33	3.00	1.00
Magazines	0.33	1.00	0.33	0.20	1.00	0.20
Radio	1.00	3.00	1.00	1.00	0.20	0.33
Television	3.00	5.00	1.00	1.00	3.00	3.00
Billboards	0.33	1.00	5.00	0.33	1.00	0.33
Social networks	1.00	5.00	3.00	0.33	3.00	1.00

Table 16. The interdependence of the criteria according to the criterion of effectiveness.

	Newspapers	Magazines	Radio	Television	Billboards	Social networks
Newspapers	1.00	3.00	1.00	0.33	3.00	1.00
Magazines	0.33	1.00	0.33	0.20	3.00	0.33
Radio	1.00	3.00	1.00	1.00	0.20	3.00
Television	3.00	5.00	1.00	1.00	3.00	3.00
Billboards	0.33	0.33	5.00	0.33	1.00	0.33
Social networks	1.00	3.00	0.33	0.33	3.00	1.00

Table 17. The interdependence of the criteria according to the criterion of relation between advertising activities of the media.

	Newspapers	Magazines	Radio	Television	Billboards	Social networks
Newspapers	1.00	1.00	1.00	0.33	3.00	1.00
Magazines	1.00	1.00	0.33	0.14	3.00	1.00
Radio	1.00	3.00	1.00	0.20	1.00	3.00
Television	3.00	7.00	5.00	1.00	3.00	0.33
Billboards	0.33	0.33	1.00	0.33	1.00	0.33
Social networks	1.00	1.00	0.33	3.00	3.00	1.00

Table 18. The interdependence of the criteria according to the criterion of impact of advertising activities.

	Newspapers	Magazines	Radio	Television	Billboards	Social networks
Newspapers	1.00	3.00	1.00	0.33	1.00	1.00
Magazines	0.33	1.00	0.33	0.20	3.00	0.20
Radio	1.00	3.00	1.00	1.00	0.20	0.33
Television	3.00	5.00	1.00	1.00	3.00	3.00
Billboards	1.00	0.33	5.00	0.33	1.00	0.33
Social networks	1.00	5.00	3.00	0.33	3.00	1.00

Then, the weights are normalized and are multiplied by the weights that are obtained in Table 12, which are the weights of advertising activities in the criteria, as shown in the following relationships.

$$\begin{aligned}
 W_{A1} = W_{41} \times W_{31} &= \begin{matrix} 0.11 & 0.09 & 0.26 & 0.04 & 0.03 & 0.21 & 0.16 & 0.134 \\ 0.11 & 0.09 & 0.03 & 0.63 & 0.26 & 0.21 & 0.16 & 0.232 \\ 0.04 & 0.26 & 0.09 & 0.04 & 0.09 & 0.07 & 0.22 & 0.095 \\ 0.32 & 0.44 & 0.26 & 0.13 & 0.26 & 0.21 & 0.22 & 0.263 \\ 0.32 & 0.03 & 0.09 & 0.04 & 0.09 & 0.07 & 0.09 & 0.103 \\ 0.11 & 0.09 & 0.26 & 0.13 & 0.26 & 0.21 & 0.16 & 0.174 \end{matrix} \\
 W_{A1} = W_{42} \times W_{32} &= \begin{matrix} 0.09 & 0.07 & 0.35 & 0.07 & 0.03 & 0.15 & 0.13 & 0.108 \\ 0.09 & 0.07 & 0.04 & 0.33 & 0.03 & 0.03 & 0.29 & 0.087 \\ 0.03 & 0.21 & 0.12 & 0.11 & 0.24 & 0.15 & 0.13 & 0.163 \\ 0.44 & 0.07 & 0.35 & 0.33 & 0.39 & 0.46 & 0.13 & 0.300 \\ 0.26 & 0.21 & 0.04 & 0.07 & 0.08 & 0.05 & 0.21 & 0.131 \\ 0.09 & 0.36 & 0.12 & 0.11 & 0.24 & 0.15 & 0.13 & 0.212 \end{matrix} \\
 W_{41} = W_{44} \times W_{34} &= \begin{matrix} 0.15 & 0.17 & 0.09 & 0.10 & 0.27 & 0.17 & 0.12 & 0.178 \\ 0.05 & 0.06 & 0.03 & 0.06 & 0.09 & 0.03 & 0.19 & 0.060 \\ 0.15 & 0.17 & 0.09 & 0.31 & 0.02 & 0.06 & 0.04 & 0.129 \\ 0.45 & 0.28 & 0.09 & 0.31 & 0.27 & 0.51 & 0.19 & 0.339 \\ 0.05 & 0.06 & 0.44 & 0.10 & 0.09 & 0.06 & 0.27 & 0.088 \\ 0.15 & 0.28 & 0.26 & 0.10 & 0.27 & 0.17 & 0.19 & 0.206 \end{matrix} \\
 W_{41} = W_{45} \times W_{35} &= \begin{matrix} 0.15 & 0.20 & 0.12 & 0.10 & 0.23 & 0.12 & 0.25 & 0.160 \\ 0.05 & 0.07 & 0.04 & 0.06 & 0.23 & 0.04 & 0.25 & 0.078 \\ 0.15 & 0.20 & 0.12 & 0.31 & 0.02 & 0.35 & 0.15 & 0.174 \\ 0.45 & 0.33 & 0.12 & 0.31 & 0.23 & 0.35 & 0.05 & 0.313 \\ 0.05 & 0.02 & 0.58 & 0.10 & 0.08 & 0.04 & 0.15 & 0.127 \\ 0.15 & 0.20 & 0.04 & 0.10 & 0.23 & 0.12 & 0.15 & 0.149 \end{matrix} \\
 W_{41} = W_{46} \times W_{36} &= \begin{matrix} 0.14 & 0.08 & 0.12 & 0.07 & 0.21 & 0.15 & 0.35 & 0.130 \\ 0.14 & 0.08 & 0.04 & 0.03 & 0.21 & 0.15 & 0.05 & 0.105 \\ 0.14 & 0.23 & 0.12 & 0.04 & 0.07 & 0.45 & 0.25 & 0.127 \\ 0.41 & 0.53 & 0.58 & 0.20 & 0.21 & 0.05 & 0.15 & 0.378 \\ 0.05 & 0.03 & 0.12 & 0.07 & 0.07 & 0.05 & 0.15 & 0.069 \\ 0.14 & 0.08 & 0.04 & 0.60 & 0.21 & 0.15 & 0.05 & 0.191 \end{matrix} \\
 W_{41} = W_{47} \times W_{37} &= \begin{matrix} 0.14 & 0.17 & 0.09 & 0.10 & 0.09 & 0.17 & 0.21 & 0.131 \\ 0.05 & 0.06 & 0.03 & 0.06 & 0.27 & 0.03 & 0.13 & 0.057 \\ 0.14 & 0.17 & 0.09 & 0.31 & 0.02 & 0.06 & 0.13 & 0.165 \\ 0.41 & 0.29 & 0.09 & 0.31 & 0.27 & 0.51 & 0.29 & 0.341 \\ 0.14 & 0.02 & 0.44 & 0.10 & 0.09 & 0.06 & 0.04 & 0.132 \\ 0.14 & 0.29 & 0.26 & 0.10 & 0.27 & 0.17 & 0.21 & 0.175 \end{matrix}
 \end{aligned}$$

Finally, the matrix of the importance of promotional activities will be formed relative to the criteria. This matrix is represented by W_A as follows:

Table 19. Matrix of the importance of advertising activities relative to the criteria.

Newspapers	0.134	0.108	0.140	0.178	0.160	0.130	0.131
Magazines	0.232	0.087	0.075	0.060	0.078	0.105	0.057
Radio	0.095	0.163	0.189	0.129	0.174	0.127	0.165
Television	0.263	0.300	0.311	0.339	0.313	0.378	0.341
Billboards	0.103	0.131	0.117	0.088	0.127	0.069	0.132
Social networks	0.174	0.212	0.167	0.206	0.149	0.191	0.175

Step five: Determination of the prioritization of the promotional and advertising activities

In the final Step, the final preference of the advertising activities is determined. The advertising activities of W_C matrix are multiplied by W_A to determine the final preference, and these activities are ranked based on the weight that is obtained for each advertising activity.

$$W_{ANP} = W_C \times W_A = \begin{matrix} 0.134 & 0.108 & 0.140 & 0.178 & 0.160 & 0.130 & 0.131 & 0.2068 & 0.1372 \\ 0.232 & 0.087 & 0.075 & 0.060 & 0.078 & 0.105 & 0.057 & 0.2113 & 0.1103 \\ 0.095 & 0.163 & 0.189 & 0.129 & 0.174 & 0.127 & 0.165 & 0.1198 & 0.1451 \\ 0.263 & 0.300 & 0.311 & 0.339 & 0.313 & 0.378 & 0.341 & 0.1215 & 0.3130 \\ 0.103 & 0.131 & 0.117 & 0.088 & 0.127 & 0.069 & 0.132 & 0.1318 & 0.1107 \\ 0.174 & 0.212 & 0.167 & 0.026 & 0.149 & 0.191 & 0.175 & 0.1166 & 0.1836 \\ & & & & & & & 0.0921 & \end{matrix}$$

Finally, the final weights of the advertising activities of Tehran Stock Exchange investment companies and their ranks are as follows:

Table 20. The final weight of the advertising activities.

Newspapers	0.1372	4
Advertising methods	Final weight	rank
Magazines	0.1103	6
Radio	0.1451	3
Television	0.3130	1
Billboards	0.1107	5
Social networks	0.1836	2

According to the above tables, by following the achievement of the weights of the advertising activities of Tehran Stock Exchange investment companies, it has finally been determined that television takes up the highest weight and will enjoy a more effective efficiency towards the fulfillment of advertising. In addition, the advertising activities of magazines are less important and take the sixth rank based on expert opinion.

Conclusion

The main question is how can advertising activities of investment companies in Tehran Stock Exchange be prioritized based on financial literacy? In order to answer this question, we first identified the investment activities of the investment companies using previous researches and the opinion of the experts. By reviewing them and with the opinion of the experts, the questionnaires were completed and these activities were ranked using the method of network analysis by step-by-step method. According to its results, advertising activities using the TV have the highest weight among other components, which indicates that the use of television for advertising in investment companies in the Tehran Stock Exchange is very influential and this issue should be paid more attention. Social networking was also ranked in the second place, which indicated the being-up-to-date and the importance of new technologies in people’s lives and advertising, and it should not be easily overlooked. In the end, two

activities of billboards and magazines with a very small difference were placed in the fifth and sixth ranking, which means that these two advertising activities have less effect than other advertisements available in the field of the investment companies in the stock exchange. For the evaluation of advertising activities by considering the desired criteria, the activities have been compared and analyzed by radar chart, which are discussed below. In this chart, the higher rating is given to an indicator in the activities or criteria, its radar chart moves more outwards (circle environments) and occupies more area, and vice versa, the more weaker activities or criteria, the radar chart is more isolated and it is toward inside and occupies less area.

Table 21. The Importance of advertising activities relative to the criteria.

	Type of consumer	Type of media	Media access	Availability	Effectiveness	The relationship between costs	The impact of advertising campaigns
Newspapers	0/134	0/108	0/140	0/178	0/160	0/130	0/131
Magazines	0/232	0/087	0/075	0/060	0/078	0/105	0/057
Radio	0/095	0/163	0/189	0/129	0/174	0/127	0/165
Television	0/263	0/300	0/311	0/339	0/313	0/378	0/341
Billboards	0/103	0/131	0/117	0/088	0/127	0/069	0/132
Social networks	0/174	0/212	0/167	0/206	0/149	0/191	0/175

- According to the blew-mentioned radar chart, the advertising activities through TV take up the highest value in all the criteria and are closer to the circumference. This indicates the greater importance of this method by taking into account all the criteria that are compared to other methods.
- In the criterion of consumer type, the use of magazines has the highest value after television and the related activities are closer to the circumference and have the higher importance than the social network in this criterion. In general, it means the use of advertising through social networks is more important for the general public, but specific groups of stock market investors were more likely to use magazines for these affairs that the magazines should be used more for advertising of these groups after they were recognized.
- In the criterion of media access, the use of radio takes up the highest value after television, is closer to the circumference, and is more important than social networks. It means that access to radio was easier than access to social networks in some areas. By identifying these areas, the radio should be used more to advertise investment companies in the stock market in these areas (in this case, given the ever-increasing growth of social networks and the proximity of these two points in the chart to each other, selection of advertising activity should be done very smartly). Among these areas, it is possible to mention the outlying areas of the country.
- In the criterion of availability, magazines have more weight and are more important for the purpose of advertising of exchange investment companies after television and social networks, which means that there are many magazines readily available to them who are, for example, sellers of non-exchange goods, and magazines can be used to advertise stock market companies for these persons.

- In the criterion of effectiveness, three advertising activities, i.e. radio, newspapers, and social networks are placed in nearly one point after television, which indicates that the influence of the advertising of Tehran Stock Exchange investment companies through radio, newspapers, and social networks is generally the same after television.
- In the criterion of the relationship between costs, the radios and newspapers have less cost in comparison with the three activities that almost have the same effectiveness.

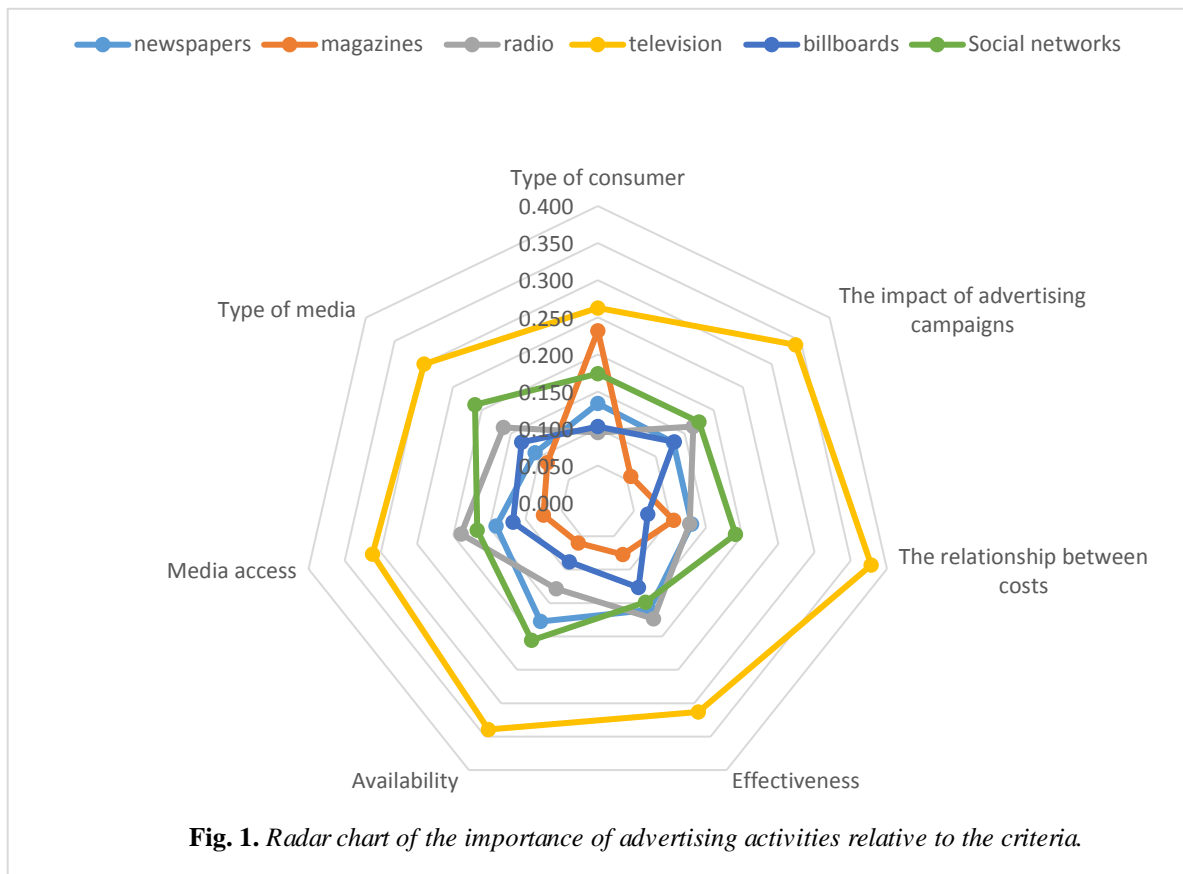
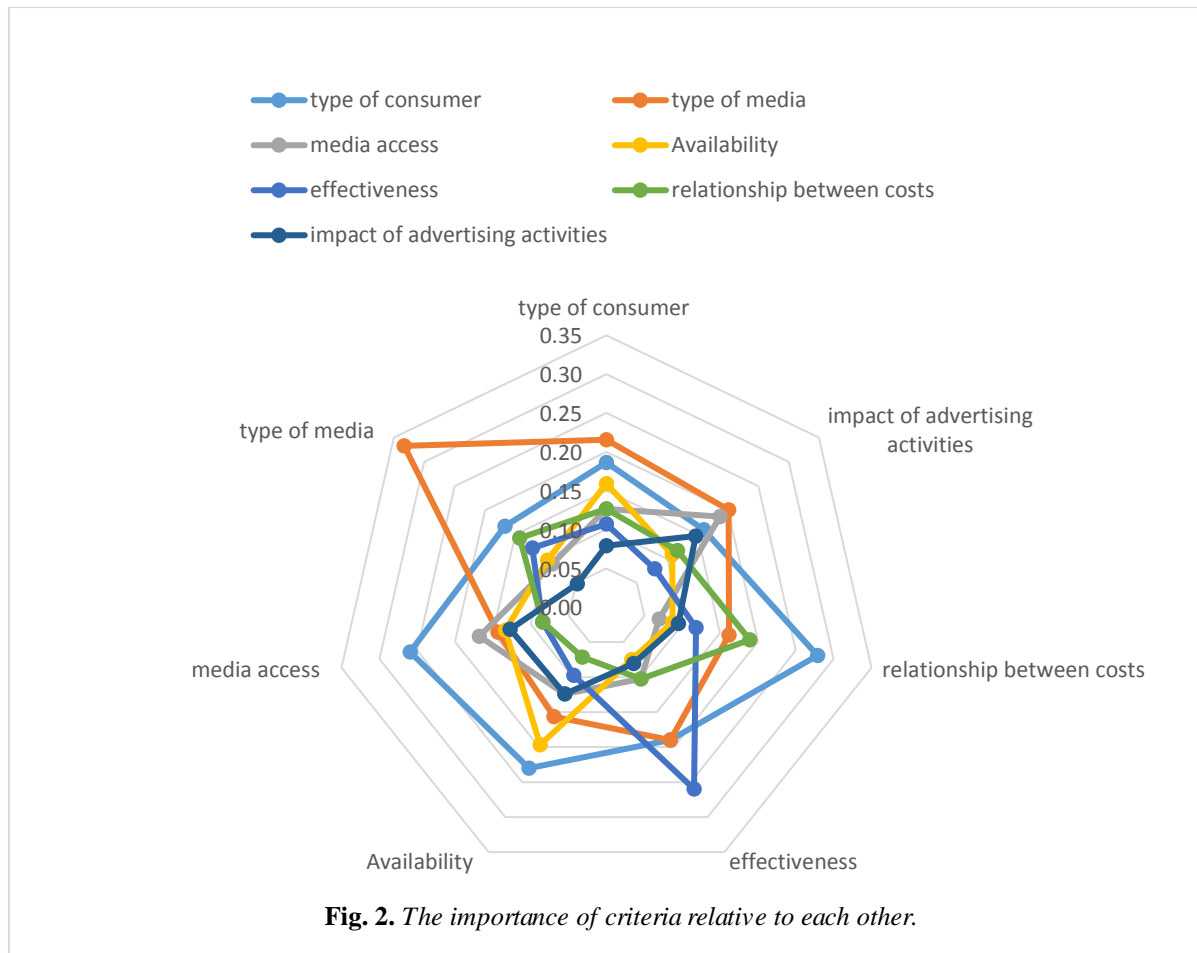


Table 22. The importance of criteria relative to each other.

	Type of consumer	Type of media	Media access	Availability	Effectiveness	The relationship between costs	The impact of advertising campaigns
Type of consumer	0/19	0/17	0/26	0/23	0/19	0/28	0/16
Type of media	0/22	0/33	0/14	0/16	0/19	0/16	0/20
Media access	0/13	0/09	0/17	0/12	0/10	0/07	0/19
Availability	0/16	0/10	0/13	0/20	0/07	0/09	0/11
Effectiveness	0/11	0/12	0/08	0/10	0/26	0/12	0/08
The relationship between costs	0/13	0/14	0/08	0/07	0/10	0/19	0/12
The impact of advertising campaigns	0/08	0/05	0/13	0/12	0/08	0/09	0/15



- According to the radar chart, the importance of the criteria in relation to each other indicates that for the criterion of the impact of advertising campaigns on products and the standard of consumer type, the type of used media is important. It means, in this regard, the importance of the media that are more well-known can be referred, and the use of these media are prioritized.
- Moreover, in the criteria of access to the media and the availability and relationship between advertising costs of media, the type of target consumer is very important.

According to the achieved studies from this research and obtained rank and its analysis, the following suggestions are proposed:

- Investment in the stock market is associated with concerns. Hence, investment companies invest in the stock market with knowledge of financial skills and use the financial literacy skills from their shareholders. Therefore, it is suggested that these concerns may be reduced by investing in these companies.
- Considering the high impact of television and social networks on people's lives and the convenient access to them, investment companies in the stock exchange should make use of television and social networks to advertise their companies and businesses so that their stock value can experience an increase and they can experience a higher level of achievement and success.
- Magazines are more easily accessible after television for certain groups of stock investors like vendors of commodities in non-exchange markets and so on. Therefore, it is suggested that these magazines are used to advertise Tehran Stock Exchange investment companies for these groups.
- In the marginal and remote areas of the country, the use of Radio and social networks is recommended for the promotion of Tehran Stock Exchange investment companies.

- For those who do not want to spend a lot of money on advertising and at the same time have an acceptable impact, it is suggested that they use the radio and the newspaper to advertise Tehran Stock Exchange companies.
- It is suggested that the most known media are used for advertising campaigns and consumers.
- For the conduct of future research, it is possible to prioritize the advertising activities in Tehran Stock Exchange investment companies by means of different methods, such as fuzzy AHP, super matrix network analysis, etc. and to compare the obtained results with those of this research.
- For the better measurement of advertising activities in investment companies, more diverse and varied criteria can be used to obtain results that are more accurate.

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Appendix

Questionnaire:

As per the following questionnaire, please rate the importance of each of the following advertising activities by taking into account the desired criteria via the statements (very high, high, moderate, low, and very low) in the corresponding columns.

The advertising activities of Tehran Stock Exchange investment companies based on investors' financial literacy and the desired criteria		Very high	High	Moderate	Low	Very low
No.						
Criterion of the type of target consumer						
1	Newspapers					
2	Magazines					
3	Radio					
4	Billboards					
5	Television					
6	Social networks					
Criterion of media type						
1	Newspapers					
2	Magazines					
3	Radio					
4	Billboards					
5	Television					
6	Social networks					
Criterion of media access						
1	Newspapers					
2	Magazines					
3	Radio					
4	Billboards					
5	Television					
6	Social networks					
Criterion of availability						
1	Newspapers					
2	Magazines					
3	Radio					

-
- 4 Billboards
 - 5 Television
 - 6 Social networks

Criterion of effectiveness

- 1 Newspapers
- 2 Magazines
- 3 Radio
- 4 Billboards
- 5 Television
- 6 Social networks

Criterion of relationship between the advertising costs of companies

- 1 Newspapers
- 2 Magazines
- 3 Radio
- 4 Billboards
- 5 Television
- 6 Social networks

Criterion of advertising campaigns on products

- 1 Newspapers
 - 2 Magazines
 - 3 Radio
 - 4 Billboards
 - 5 Television
 - 6 Social networks
-