

# OPTIMAL ADVERTISING METHODS AND CREATING INVESTMENT CONFIDENCE

**Hassan Ali Al-Ababneh, Irbid National University**  
**Khalid Thaher Amayreh, Irbid National University**

## ABSTRACT

*The internationalization of world business sectors into a solitary framework decides the reasonable need and significance of exploration pointed toward finding new methodologies and answers for elevate merchandise and ventures to guarantee serious situations by putting resources into promoting. The key financial and numerical techniques are recognized, the utilization of which guarantees the accomplishment of vital promoting pointers and enhancement of the publicizing portfolio. The utilization of two-measure monetary and numerical displaying made it conceivable to choose and upgrade the promoting portfolio by guaranteeing its adequacy by boosting monetary execution with a base degree of danger. The need of considering publicizing as a venture cycle with explicit highlights and attributes is contended. The consequences of a basic investigation of the hypothetical parts of the highlights of the utilization of promoting as a multifactorial wonder in the showcasing exercises of associations can be applied in commonsense exercises in the arrangement of an ideal publicizing portfolio with an enhanced danger level. In framing methodological ways to deal with making an ideal promoting portfolio with a broadened hazard level, reasonable suggestions have been created for speculator publicists, the utilization of which will amplify monetary execution from putting resources into publicizing.*

**Keywords:** Marketing, Advertising, Investing in Advertising, Advertising Campaign Effectiveness, Mathematical Modeling.

## INTRODUCTION

In modern business conditions, it is not possible to imagine the activities of any organization or company without such a marketing tool as advertising. Advertising in modern society in itself is a multifactorial phenomenon. It relies on communication tools, the media, Internet resources and direct marketing. This is advertising on radio, television, in periodicals, Internet advertising, its other types (the list is constantly expanding with the advent of new communication capabilities and tools). Each type of advertising forms its target audience and the related services sector. Note that these audiences may intersect, and they overlap, which enhances the effectiveness of advertising exposure. When performing an assessment of the quality and effectiveness of advertising, it becomes necessary to differentiate it according to various criteria. For example, by the type of audience, the frequency of sound, the form of advertising (audio, video), the number and frequency of views, and many other innovative tools. In addition, when evaluating the advertising effect, the influence of various factors, which are represented by both controlled (internal) processes and autonomous processes that are independent of the advertiser and are not amenable to correction, is taken into account.

Therefore, to make a decision on conducting an effective advertising campaign, there is a need, on the one hand, to divide advertising into forms and types according to various

classification criteria, and, on the other hand, to create an advertising portfolio that would satisfy the advertiser-investor with its profitability level at an acceptable level of risk. The solution to this problem is difficult due to its multicriteria and the impact of a large number of diverse factors. It should be noted that the volatility of the external environment and the transformation processes of the world economy determine the top management of companies to review existing methods of managing and promoting goods and services on the market in order to ensure the effectiveness of activities and rational investment in advertising.

Today, the situation on the marketing market in general and the advertising market, in particular, has changed a lot (unlike the times of the end of the 20th century - the beginning of the 21st). The main change is the multidimensionality and versatility of marketing schemes and advertising tools that allow you to maintain positive dynamics in the development of projects, to achieve a return on advertising investments. Simple and one-sided schemes today almost do not work or work partially, but in close connection with other elements of advertising or marketing strategy. Any advertising campaign or company for the customer is an active part in advertising and marketing investments. Based on the presented, one should consider the theoretical aspects of the development of advertising and its main types in the scientific literature

### **Theoretical Aspects of the Development of Advertising and its main Types**

The main questions in the study of the definition of the concept of advertising activity were dealt with by a group of the following scientists: (Nelson, 1978; Farris & Quelch, 1987); Batra, 1986; Aaker & Biel, 2013; Rossiter & Percy, 1987). Which distinguish advertising as a basic element of influencing the knowledge, attitude and intentions of a potential consumer, which is the main objective of advertising, but does not take into account the conceptual need for advertising in the marketing mix, which in modern conditions is an integral part of a marketing strategy.

However, special attention in the study of the theory of the development of advertising deserves the study of a group of the following scientists such as: (Wells, 2014), (Aaker & Biel, 2013), (Meyer, 1995) in scientific papers that examine the suggestive possibilities of the advertising text and the problems of manipulating the consumer's subconscious, highlighting a completely new role in the process of managing the supply and marketing activities of service and industrial enterprises such as advertising, but the features of the use of advertising and its main types in the process of promoting goods are not sufficiently disclosed and services, which requires further more detailed and informed research.

It is worth noting that a completely new era in the theory of the development of marketing and advertising, as the main element of promotion, is formed in the scientific research of a group of scientists such as: (Ducoffe, 1996) (Teletov et al., 2019), (Song et al., 2011) that highlight advertising as the newest direction in world science, studying the methods and techniques of directed linguistic impact on the consciousness and subconscious of both an individual person and the broad masses. These approaches allow us to determine the need to use advertising as the main tool for influencing the consumer in order to promote goods and services, but they do not take into account the main approaches to increasing customer loyalty and gaining confidence, which in modern conditions are the main results of the effective use of advertising.

The main features of the use of advertising in various industries are considered in the scientific works of a scientist (Scott, 1994), which considers advertising as a targeted selection of visual elements, which allows us to state the relationship of verbal and visual marks to literary works that appear in advertising are included in cooperation with the rest non-literary characters.

They also participate in the presentation of concepts, abstractions, actions, metaphors and become modifiers that are used to construct complex content.

This approach allows you to highlight the main function of advertising - communication and promotion, but does not take into account the whole range of tasks and goals performed by advertising in modern conditions. It is also worth noting the scientific approaches of a group of the following scientists: (Anderson, 2012), (Duncan, 2001), (Chickering & Heckerman, 2003), (Eldering et al., 2011), (Rodriguez, 2008), (Delbaere et al., 2011) based on the development of the basic scientific postulate of the development of advertising as a separate category and the need for its use in all sectors of the production and marketing activities of service and industrial enterprises, which will ensure the expansion of the market and the sale of goods. These approaches determine the important role of advertising and its connection with the promotion of manufactured goods and services, but do not take into account the features of its implementation, taking into account all the influencing factors, which requires further in-depth research.

Advertising activity and the features of its functioning in modern conditions are considered in the scientific works of a group of scientists: (Gengler & Reynolds. 1995), (Kelley et al., 2015), (Rosenbaum-Elliott, 2021), which determine the basis of advertising theory: functions, goals, objectives as an element of the marketing mix for promoting goods and services, and also highlight the role of advertising in creating a strong brand by studying consumer psychology and promotion marketing research. These approaches have identified the need for strategic management of advertising as an element of marketing in modern conditions, but do not reveal the full range of key tasks and goals for optimizing the organization is advertising portfolio, which leads to conceptual relevance and the need for further research.

The problems of evaluating the effectiveness of the impact of advertising on potential consumers of goods and services are being actively investigated. Therefore, Moriarty et al. (2014) focuses on the criteria for evaluating the effectiveness of advertising. In particular, he gives the following indicators: - determination of the relationship between advertising and specific marketing goals (this can be both an increase in sales and an improvement in the brand identity of the company); - the establishment of chains of links between the indirect effects of advertising and its final results; - assessment of the impact on the effectiveness of advertising of the creative component; - understanding the impact of advertising on a business result, both in the short and long term. Lavidge & Steiner (1961) describe a model for predictive measurements of advertising performance.

Deyan (2003) explores the mechanisms of influence of advertising, the ways of its creation, the preparation of advertising campaigns, as well as the technologies used in commercial communications. More recent studies examine the effectiveness of advertising in financial services. To develop the right advertising policy and develop the optimal advertising strategy, researchers use various mathematical methods. So, Ferrentino & Boniello (2017) investigated the formation of an optimal advertising policy and the minimization of advertising and organizational expenses (using the notification of potential participants, using the word-of-mouth effect). Estévez & Fabrizio (2014) studied the possibilities of measuring the effectiveness of advertising and offer a key indicator of evaluating its effectiveness, which consists of three parts: recall, brand image and intention to purchase. As a result of their experiment on 20 fixed 12 variable brands of companies, it was concluded that such an indicator characterizes the state of the market and its perception by the consumer.

The work Smirnova (2004) is devoted to assessing the quality and effectiveness of advertising and its individual types, which explores radio advertising in detail, including its

classification and features. Attention has been paid to the issues of practical evaluation of advertising effectiveness Aksha (2004), the work of which considers the prerequisites for creating successful advertising; the author considers them optimization of the planning strategy, a detailed study of the parameters of the target audience and the level of creativity of professionals. The level of impact on consumers and the possibilities of Internet advertising are analyzed in the work (Pergelova et al., 2010).

To determine the effectiveness of the functioning of advertising, mathematical models are formed, starting from the model (Lavidge & Steiner, 1961) that link the effectiveness of advertising with the performance of its functions. Specialists deserve special attention from targeted advertising, so (Li & Huang, 2016) analyze the possibilities of more accurate delivery to consumers (online behavioral advertising).

They also offer a model for generating such advertising based on empirical studies. In further modern developments, more and more advanced mathematical tools are used and programming elements are introduced, including modern metaheuristic methods. At the same time, the issue of deciding on the development of a practical strategy and tactics for an advertising company remains quite difficult for advertisers. This is due both to the dynamics of the development processes of advertising itself, and to the constant changes that occur in the environment of factors influencing it.

### **Methodological Aspects of the Study of the main Features of Investing in Advertising**

The studies conducted allow us to evaluate the effectiveness of certain types of advertising and advertising events in general, to model advertising activities, however, for a full and high-quality evaluation of advertising, which is limited by the scope of investment volumes and the risk level is not enough. We believe that it is necessary and relevant to evaluate the effectiveness of an advertising company as an investment project (more precisely, a set of investment projects limited by the scope of financing with a given level of risk). To achieve the goal of the study, the following tasks:

1. Highlight the main directions of development of modern advertising as vectors of investment diversification, which will reduce investment risks;
2. Clarify the classification of types of advertising;
3. To form an advertising portfolio as a portfolio of investments, taking into account restrictions on capital investments;
4. highlight certain areas of advertising development that will provide maximum profit with minimal risk, using a set of mathematical methods;
5. Provide the investor-advertiser with the opportunity of the best individual choice from the set of options.

The methodological basis of the study is the fundamental theoretical aspects in the field of economics, marketing, investment, finance, as well as the conceptual foundations of sustainable development. To determine the effectiveness of certain types of advertising and its use in marketing, as well as their interaction in the system of advertising events in general, the study applied a systematic methodological approach to the classification of advertising and the characteristics of the advertising portfolio.

The study used such general scientific and specific methods as: scientific abstraction (to justify the need to consider advertising and evaluate its effectiveness as a set of investment projects that are limited by budget volumes and the level of market risks); comparative analysis (when researching the main theoretical aspects and approaches to assessing the quality and

effectiveness of advertising and its main types); system-structural analysis (to justify the key types of advertising, their characteristics and features of use); risk analysis methods (when classifying an advertising portfolio and its main constituent elements); economic and mathematical modeling (in the formation of basic methodological approaches to creating an optimal portfolio with a diversified risk level, striving to minimize and maximize financial results from investing in advertising, which ensures the effectiveness of the marketing mix.

The information base of the study is the main legislative and regulatory documents, acts and materials in the field of organizing and regulating the marketing and investment activities of the World Bank, the International Bank for Reconstruction and Development, the International Monetary Fund, which regulate financial services, the UN Statistics Division, the Statistical Service European Union, Organization for Economic Co-operation and Development of Other International and National Organizations, Monography and professional publishing and authoring.

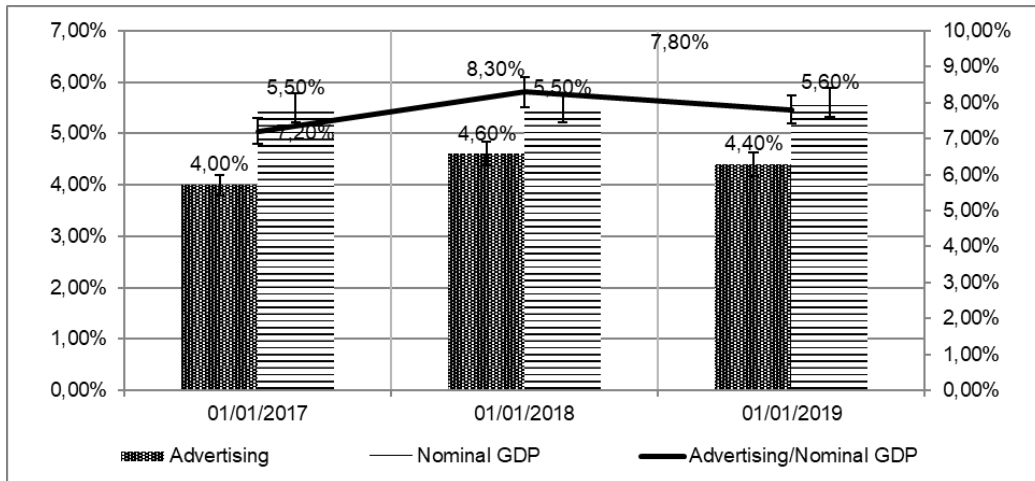
### **The Development of Advertising in the world: Classification and main types**

The development of advertising is parallel to the development of communications and communication. At the same time, advertising is being modified in various directions, its new types are being formed, which are determined both by the objectives of the advertising itself, and by the forms and types: of the advertised branches of the economy, the activities of business entities, means of communication and communication; genres and forms of advertising campaign, and other factors of influence. Economic integration of the advertising market contributes to the expansion of production relations of business entities and the formation of acceptable mutually beneficial business conditions between partners.

The advertising market stimulates the economic activity of people, directing them to the satisfaction of needs and desires, causing the improvement of economic activity, comprehensively influencing the cycle of economic reproduction. The modern global advertising market, integrating into the socio-economic processes of the development of society, is becoming an integral element of the global economy. This is due to the formation of the information economy and the development of modern media markets in the 21st century. The advertising market is developing in almost all directions, and in new types of advertising (Internet, online technology, etc.) there is a sharp rise in advertising activity.

In 2018, advertising costs around the world increased by 4.6%, and by the end of the year reached 579 billion US dollars. Several markets are characterized by higher rates, primarily the markets of China, the Philippines, Argentina and Ireland. In 2020, slower growth in spending on advertising is expected than the growth of the global economy as a whole.

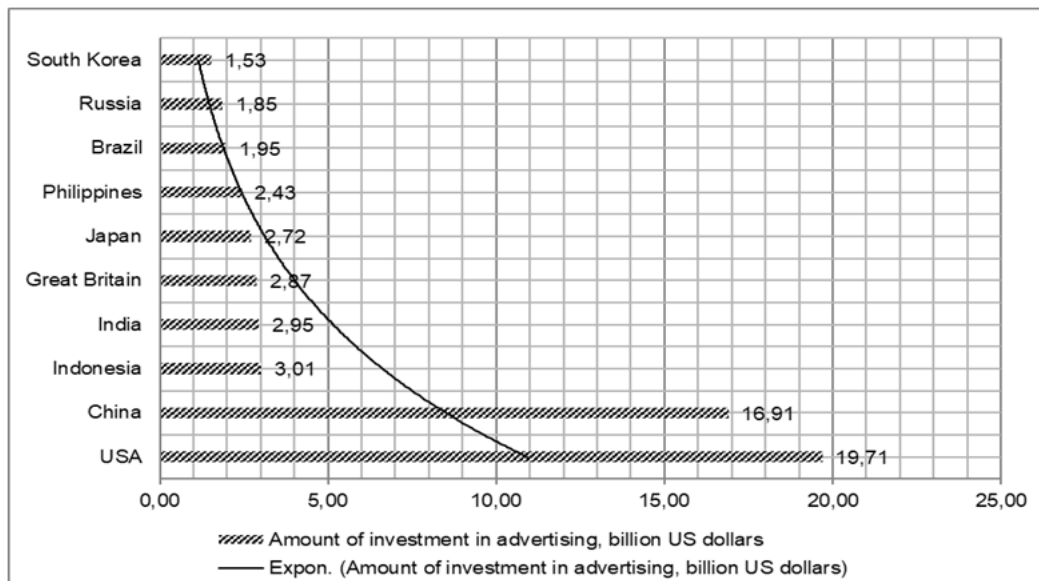
The global advertising market is affected by technological factors in the development of the media industry, in particular the widespread use of the Internet, simplifying access to it, increasing the speed of data transfer, increasing mobility, etc. The Internet has given a new impetus to the development of the global advertising market, using its main advantage - interactivity. The growth of the global advertising market is due to the integration of modern principles of functioning in the common European market. In more detail, the dynamics of growth in advertising costs compared to the GDP of the countries of the world for the period from 01.01.2017 to 01.01.2019, % to figure 1.



Sources: compiled by the author

**Figure 1**  
**DYNAMICS OF GROWTH IN ADVERTISING COSTS COMPARED TO GDP OF THE COUNTRIES OF THE WORLD FOR THE PERIOD FROM 01.01.2017 TO 01.01.2019**

Between 2017 and 2019, advertising costs around the world increased by \$ 77 billion. 26% of these additional advertising costs will come from the United States, 22% from China, followed by Indonesia, India, the UK and Japan, each contributing 4%. In general, countries with growing markets will contribute 57% of additional advertising costs between 2017 and 2020, and their share of the global market will increase from 37% to 39% Figure 2.



Sources: compiled by the author

**Figure 2**  
**TEN COUNTRIES OF THE WORLD WITH THE LARGEST VOLUME OF INVESTMENT IN ADVERTISING, BILLION DOLLARS USA FOR THE PERIOD FROM 01.01.2017 TO 01.01.2019**

Ten of the largest exhibitors with growing markets (China, Indonesia, India, the Philippines, Brazil, Russia and South Korea), they will jointly contribute 40% of the money spent on advertising over the next three years. When investing resources, the advertiser, first, has

one or more goals, objectives, which, and allow you to determine the forms (types) of advertising. At this stage of the advertising campaign, a decision is made to diversify investments in various types (subspecies) of advertising. Such distribution of advertising resources allows, on the one hand, to more effectively (quickly, efficiently, economically) achieve the goals of the advertising stream.

On the other hand, this is a simultaneous diversification of the risks of financial investments, which also enhances their effectiveness. For a more detailed study of such diversification, we consider it appropriate to refer to the classification of advertising.

There are various approaches to advertising classification. After the analysis, in our opinion, you can combine the types of advertising depending on its goals and means of distribution and further group them according to a number of signs. The classification of advertising based on its key objectives is presented in Table 1.

Criterion of classification	Advertising type	Subtypes	Notes
Product awareness and associativity	Corporate branding	Companies; Brand, trade mark; Type of product; goods	Allocation for the company or product
Introduction of values and mission of the company	Corporate strategy advertising	Corporate strategy	Advertising, introducing the values and mission of the company
Georeferencing of advertising	Point advertising ...	Trading Trade/service enterprises	In a place where the beerhouse has worked for many years, it is not worth opening a bank.
Formation of political image / anti-advertising	Formation of the image of a politician in the eyes of the electorate / anti-advertising	Image of politics, political party, country	The most expensive advertising.
Socio-explanatory mission	Public service advertising affects the audience, united by social characteristics	Advertising for various social groups: students, workers, retirees, etc.	Socially responsible advertising
Business advertising (professional advertising)	Affects the audience, united by professional characteristics	Professional advertising	Highly specialized audience
Product awareness and associativity	Corporate branding	Companies; Brand, trade mark; Type of product; goods	Allocation for the company or product

Sources: compiled by the author based on (Dehay & Landwehr. 2019).

Advertising is a link in the market, disseminating information about the availability of goods, the conditions for their purchase and consumption. At the same time, it participates in the formation of a product offer from the manufacturer and, at the same time, in identifying the degree of usefulness of this offer for a specific market segment or consumer masses. Without the ability to use advertising media, the ability of the manufacturer to influence the sales market decreases, the risk of being pushed aside by a competitor increases. Being an instrument of competition, advertising exacerbates it. Moreover, it performs one of the most important tasks - it helps to create conditions for consumers to choose a company, enterprise, their goods and services. Intensifying the competition for the buyer, advertising helps to improve the quality of these goods and services, and reduces their prices. Thanks to the information function of

advertising, the market is becoming more accessible to the buyer. The buyer acquires the right to choose the goods (services) in accordance with their cash income, personal needs and motives.

The presented classification is exhaustive only at the current moment, since modern means of communication and communication are developing rapidly, and new types of advertising appear with them. It should consider the classification of advertising based on their means of distribution, which is presented in Table 2.

<b>Criterion of classification</b>	<b>Advertising type</b>	<b>Subtypes</b>	<b>Notes</b>
Direct advertising	Direct transfer of advertising information to a potential client	<ol style="list-style-type: none"> <li>1. Advertising by mail;</li> <li>2. Materials handed in person</li> <li>3. Online distribution</li> <li>4. Telephone advertising;</li> <li>5. Advertising in mobile applications;</li> <li>6. Word-of-mouth advertising.</li> </ol>	Direct contact with a potential consumer
Advertising in periodic press	Advertising designed for a wider reading audience	<ol style="list-style-type: none"> <li>1. Newspaper advertising;</li> <li>2. Magazine advertising;</li> <li>3. Directory and yellow pages advertising;</li> <li>4. Advertising in company bulletins.</li> </ol>	A wide range of potential consumers
Print advertising	Advertising designed for a wider reading audience	Advertising in/on: <ol style="list-style-type: none"> <li>1. catalogues;</li> <li>2. booklets;</li> <li>3. brochures;</li> <li>4. posters;</li> <li>5. postcards,</li> <li>6. calendars,</li> <li>7. flyers, leaflets, etc.</li> </ol>	
Screen advertising	Advertising designed for a wider audience	<ol style="list-style-type: none"> <li>1. Cinema advertising (product placement);</li> <li>2. TV advertising;</li> <li>3. Advertising on slide-projections.</li> </ol>	
Broadcast advertising	TV	Feedback advertising	The ability to exchange information with potential buyers of the product or service.
	Internet advertising	Feedback advertising (chats, callbacks, Internet correspondence, etc.)	
	Outdoor advertising	<ol style="list-style-type: none"> <li>1. Showcases with goods;</li> <li>2. Billboards;</li> <li>3. Advertising posters;</li> <li>4. Advertising panels (with fixed or running inscriptions);</li> <li>5. Advertising structures for poster placement.</li> </ol>	A wide range of potential consumers
Transport advertising	Advertising designed for persons using public transport.	<ol style="list-style-type: none"> <li>1. Advertising on the outer surface of the vehicle;</li> <li>2. Advertising inside transport (in the vehicle salons);</li> <li>3. Advertising stands and showcases at airports, train stations, etc.</li> </ol>	



Point-of-purchase advertising	Advertising, attracting attention to the point of sales.	1. Shop signs, tablets; 2. Shop windows; 3. Packaging with brand logo	
Advertising through all means of mobile communication	Advertising designed for persons using mobile communication.	Types of mobile communication	

Sources: compiled by the author based on (Dehay & Landwehr, 2019); (Li & Huang, 2016)

Based on the above, it is necessary to divide advertising depending on the goals and means of its distribution. To achieve a specific goal, various forms and types (sub-types) of advertising can be used. Therefore, to form an advertising portfolio as an investment portfolio, taking into account the restrictions on capital investment, it is necessary to identify all the conditions and limitations of the advertising campaign (Kosakovsky Pond, et al., 2006).

Let us assume that an enterprise faces the task to hold an advertising campaign for its products and services. We consider such investing in various types (subtypes) of advertising as investments in  $n$  projects, while at the disposal of the advertiser there is the initial capital  $K$ .

Then the investment in the  $i$ -th project will be  $K_i$ , and the profit from its implementation will be  $P_i$ . Consequently, the profit of the portfolio as a whole will be  $\sum_{i=1}^n P_i$ .

We accept that  $P_i$  is a value that depends on a large number of factors, both under the control of the advertiser (from the company's professionalism, the amount of investments in a particular type of advertising; the period of investment, the selection of advertising agent) and those independent (economic, political, social factors, etc.).

It is also necessary to take into account that zero investment options are possible (not all types of advertising can be used; there is a possibility of portfolio option with  $n=0$ ). We accept that our discrete advertising portfolio is a vector  $Y = (y_1, y_2, \dots, y_i, \dots, y_n)$ , moreover,  $y_i = 1$  When the project is implemented and  $y_i = 0$ , when it deviates. Then we obtain the following characteristics of the advertising portfolio Table 3.

Characteristic	Designation and formula	Notes
Number of investment advertising projects	$n$	It is established by the advertiser and is limited by the number of types (subtypes) of advertising
Investment capital	$K = \sum_{i=1}^n K_i y_i$	It is established by the advertiser
Probability function of making a profit from the $i$ th advertising project	$p_i(P_r) = f(K_i, y_i, x_1, x_2, \dots, x_m)$ , where $x_1, x_2, \dots, x_m$ – are factors of impact on the probability of making a profit from the project	It can be taken as the result of statistical processing of empirical observations.
Probability of losses/lack of profit for the advertising project	$\bar{p}_i(P_r) = 1 - p_i(P_r)$	Magnitude opposite to $p_i(P_r)$

Absolute value of the risk of losses for the <i>ith</i> project	$W = (1 - p_i(P_r))K_{ri}$	It directly depends on the size of investments in the project and the probability of losses
Possible amount of profit for the advertising portfolio	$P_r = \sum_{i=1}^n P_{ri} p_i(P_r)$	It is determined by the size of the profit from the projects and the values of the probability function
Possible amount of losses for the advertising portfolio	$\bar{P}_r = \sum_{i=1}^n P_{ri} (1 - p_i(P_r))$	Magnitude opposite to the possible profit margin
Weighted average portfolio risk of losses / lack of profit	$L = \frac{\sum_{i=1}^n (1 - p_i(P_r)) \cdot K_{ri}}{\sum_{i=1}^n K_{ri}}$	It is determined as a weighted average value for a portfolio depending on the amount of investment capital
Dispersion as a measure of the risk of portfolio losses	$V(\bar{P}_r) = \sum_{i=1}^n (P_{ri} (1 - p_i(P_r)) - L)^2 \frac{K_{ri}}{K}$	It is determined as the mean square deviation of the portfolio's weighted average risk

Source: Developed by the author based on data (Nelson, 1978).

The advertiser is interested in an optimal portfolio, i.e. a diversified risk that seeks to a minimum and a maximum profit on capital investment. Therefore, we need to find solutions to the system:

$$\left\{ \begin{aligned} &V(\bar{P}_r) = \sum_{i=1}^n (P_{ri} (1 - p_i(P_r)) - L)^2 \frac{K_{ri}}{K} \rightarrow \min, \\ &P_r = \sum_{i=1}^n P_{ri} p_i(P_r) \rightarrow \max, \\ &\sum_{i=1}^n K_{ri} y_i \leq K, \quad y_i \in \{0;1\}, i=1.2..n, \\ &K - const, \\ &n \in [0; m], \end{aligned} \right. \quad (1)$$

Where *m* – is a total number of types (subtypes) of advertising  
*m* – Is a whole number

The solution of the system involves finding all the alternative values of the projects. This can be achieved by various methods, each of which has its own advantages and disadvantages. For example, the method of successive assignments, when a two-criterion task is reduced to a problem with a single target function.

One of the optimal parameters (in our case, this is  $(P_r = \sum_{i=1}^n P_{ri} p_i(P_r) \rightarrow \max)$ ) is taken as the target function, and for the other  $(V(\bar{P}_r) = \sum_{i=1}^n (P_{ri} (1 - p_i(P_r)) - L)^2 \frac{K_{ri}}{K} \rightarrow \min)$  a threshold value is established, which can be based on previously empirical or statistical data. The complexity lies in the fact that in order to find a large number of alternative values, it is necessary to solve such a problem repeatedly. In addition, it is necessary to consider the cases when: a) all advertising projects are independent; b) projects are dependent. For the practical solution of this problem, it is also possible to use the gradient rise method. The method implies the finding slope of the

function  $\sum_{i=1}^n P_{ri} p_i(P_r)$ , when moving up along it. Thus, we maximize the function  $P_r = f(P_{ri})$ . It is important that this method does not require calculation of  $f(P_{ri})$ , but implies that we can calculate the slope of the curve at an arbitrary point of  $P_{ri}$ , i.e. there is  $f'(P_{ri})$ , and changing its (derivative) sign will give us an extremum point. It also means that  $f(P_{ri})$  is a function of one variable (i.e. it is necessary to put aside the influence of a significant number of factors).

However, if you do not abstract away from factors influencing a function  $P_i(P_r)$ , it ( $f(P_{ri})$ ) is not one-dimensional, since the probability of making a profit depends on a large number of factors –  $P_i(P_r) = f(K_i, y_i, x_1, x_2, \dots, x_m)$ . To take into account the influence of all these factors, we replace the function  $P_r$  with a vector  $\vec{P}_r$  and derivative  $f'(P_{ri})$  – with a gradient  $\nabla f(\vec{P}_r)$ . Then we move along the function in all dimensions simultaneously until the extremum appears.

The disadvantages of this method are the following: the possibility of finding a minimum of a function instead of a maximum and saddle points, instead of extremum points that are not of interest for us. In addition, the problem may be poor convergence of the function when the gradient “jumps over” the maximum point. However, the main problem is the practical impossibility of a mathematical description of a function (due to the presence of a large number of influencing factors) and, therefore, the impossibility of finding its gradient.

In this case, the use of a metaheuristic local search method seems to be optimal, which implies the presence of the following stages, and namely, the initialization, evaluation, copying, modification and selection. The local search method is similar to the gradient rise method, but there is no need to choose the magnitude of the gradient and the movement direction. It is only necessary to check potential solutions all the time and compare them with current values. In addition, if they (potential solutions) are better, it is necessary to fix them. Therefore, we need to, by processing statistics of an enterprise (industry) advertising, highlight the initial potential solution that satisfies us. In this case,  $V(\vec{P}_r)$  is fixed at the maximum permissible level, i.e.,  $V(\vec{P}_r) \leq v$  which is also determined by the method of processing statistical or empirical data. The algorithm for calculating the following:

1.  $P_r \leftarrow$  is any initial potential solution {Initialization procedure}
2. repeat
3.  $R \leftarrow Tweak(Copy(P_r))$  {Modification procedure}
4. {Estimation and selection procedure}
5. if Quality ( $R$ ) > Quality ( $P_r$ ) then
6.  $P_r \leftarrow R$
7. end if
8. until  $P_r$  - is an ideal solution or search time is over
9. return  $P_r$
10. *Tweak* is used instead of stochastic (random) selection of a potential solution.

The local search with the fastest rise can also be used as a more advanced method. The

obtained solution will show the following value:  $P_r = \sum_{i=1}^n P_{ri} p_i(P_r) \rightarrow \max,$  with

differentiation  $\sum_{i=1}^n P_{ri}$ . Then, after ranking all projects by profit, the advertiser will choose the most desired projects for himself.

## CONCLUSION

The main results of the study allow us to state the fact that advertising is an integral part of the marketing detail of organizations in modern conditions. A critical analysis of the theoretical aspects of the development of advertising made it possible to distinguish and classify its main types depending on the average premium and its features. The main directions of advertising development are substantiated and structured, depending on the goals set for advertisers and marketers. It has been explained that advertising is a key link that will allow achieving the organization's marketing activity based on the disclosure of information about goods and services, introducing the mission and strategy of the company using the geographical location of advertising and maximizing the financial performance of investing in advertising. A classification of types of advertising is developed depending on the methods of its distribution, which, unlike the existing ones, corresponds to the current moment and is subject to constant monitoring and updating when introducing new means of communication. Developed practical recommendations on the formation of an advertising portfolio of products and services as a portfolio of investments, taking into account restrictions on capital investments. The analysis of possible mathematical methods for optimizing the advertising portfolio is carried out. It is proved that the most rational is the use of two-criterion economic-mathematical modeling, in particular, the metaheuristic local search method. The developed methodological approaches are aimed at advertisers and investors who will help ensure profit from the organization's advertising campaign and differentiation of profit by type of advertising. The developed approach involves ensuring maximum profit with minimal risk for the portfolio as a whole with the possibility of individual selection from the formed portfolio of projects the most profitable

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