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Modeling of Region Marketing Research

ABSTRACT

The article reviews the main trends in the evolution of market research, approaches to special scientific and practical modeling and worked actively relevant aspects of their problems.

The purpose of the article is to study and investigate species and modeling techniques used in marketing research.

The basis of marketing research modeling is to develop necessary measures to adapt the company (current or prospective) in the market according to the needs of consumers to achieve the objectives to meet those needs with a focus on high technology and ethical standards of considering that meet consumer needs must be more efficient than the competition. Scientific works of foreign and domestic scientists who have made significant contributions to modeling market research were considered. As a result of these studies considered quite successful use different techniques in marketing based on model designs, and calculation formulas used in carrying out market research, design, distribution channels, pricing policies and the study of consumer behavior. We studied a comprehensive model of marketing research, qualitative and quantitative models, mathematical model, which is a mathematical description of the studied economic process or object, and verbal model by which marketers try to uncover the true feelings of consumers, based on the conclusions made in choosing options for advertising illustrations for brochures, pictures on the package of subjects for promotional videos. It was investigated that the object modeling in marketing, with potentially infinite variety of relationships with the environment, though they are characterized by a set of "inputs" that creates or selects registration researcher. The result depends on the arsenal of measurement tools and opportunities for their use, methods of collection and processing of marketing information, the influence of the researcher on the "black box". Need to use model "black box" arises when dealing with the processes occurring in the environment or facility management of its operations, while the description of which we can't use information about the internal structure of the process.

Thus, the article outlines directions for further research, based on modeling of marketing research in the region.

We believe that our proposed methods and models provide more efficient conduct market research by aligning the respective functions and nature of the necessary information to make appropriate management decisions.

Key words: *marketing, model, modeling, stages of the simulation, market research.*

Problem. Despite the importance of marketing research in the management, enterprises not fully used their various organizational forms and methods of implementation. As a result, the company doesn't have reliable and adequate information necessary to manage market activity. This situation is caused by a number of objective and subjective reasons, the main ones is the lack of appropriate management business units specialized in marketing research and methodological developments in key areas of their adapted to modern conditions of market activity. In view of the studied topic is relevant.

Analysis of Recent Research and Publications. With the start of market reforms, studies various aspects of marketing that include methodological and practical approaches used in a developed market. Just a matter of marketing research is devoted to a limited number of works. Methodological issues of market research are reflected in the works of Starostina A.O. (Starostina, 1998), Sinetcka O.E. (Sinetcka, 2000), Bakushevych I.V. (Bakushevich, & Gevko, 2009), Balakireva O.N. (Balakireva, & Romat, 1999), as well as in the works of Russian authors (Golubkov, 2000), (Golubkov, 1999), (Gomol's'ka, 2006); (Bagiev, 1999). Most of the problems are dealt with listed authors concerning methodological content marketing research. It should be noted that today in Ukraine experience of domestic companies ahead of the development of scientific achievements in the theory of market research that actualizes further working mechanism of considering their specific market environment.

The Purpose of the article is to study and investigated species and modeling techniques used in marketing research.

The Main Material Research.

Marketing research is the collection, processing and analysis of data to reduce uncertainty, which promotes marketing solutions. The study exposed to the market, competitors, customers, internal capacity for enterprise. The basis of marketing research are general scientific and analytical and prognostic methods. A concrete result of research developing marketing is used in the selection and implementation of marketing strategies and tactics of the company.

At present time for the development of new marketing characteristic belief system that changes the traditional idea of modeling techniques, allowing better use of the innovation and creative thinking ideas. Traditional marketing toolkit become less effective, reducing the tendency of return per unit invested in funds. Modern supermarkets are filled with numerous modifications of the same product, catalog producers spend maximum efforts for the invention of new products and the consumer has become more demanding of his proposed goods and services. Statistics show that only 20% of innovations developed in consumer goods, and about 40% of new products for industrial purposes are demanded by consumers. Globalization, mergers and acquisitions lead to the restructuring of many markets. Companies that until recently seemed unshakable market leaders are beginning to take their positions, second pressure-European and global competition. Over all these processes dominates the growing demand for an unprecedented level of volume and quality of service. The joint effect of these factors contributes to the creation of a new imperative of market participants, taking into account the need for rapid response to emerging

and constantly changing needs. Company focused on the present imperative, seeking to keep the buyer in focus its core business, trying to develop their own innovative procedures relevant impact on changing consumer demands. Invaluable assistance in this matter can provide simulations of different marketing situations. Effective practical application of models in the enterprise associated with the development of the theory and methodology of modeling (Bazilevich, 2004).

In scientific methodology marketing term «model» used in the extended treatment. The models try to express the diversity of scientific theories marked features of systematization. Examples include the theory of market segmentation, product positioning, consumer behaviors and others. Interest in this type of models is explained on the assumption that they have the ability to replace the object of study and thus be more accessible to study than the simulated object. But such models feature provided only under certain conditions: achieving similarity model and object modeling and minor simplification for this study inherent properties. Based on the fact that the model should be partially or fully reproduce the structure of the simulated system and its functions, it can be concluded that modeling involves the construction of a counterpart that can replace the real system and give new information about it. In this regard, it can be argued that modeling suggests the presence of three elements: first, the subject, which serves as a research person, secondly, the research object (system) and, thirdly, the most object model, the dual link between subject and object. The results are the first works in the field of marketing modeling processes have been recognized and highly regarded in the scientific world. Simulation as a tool for the analysis of management decisions in practical marketing activities has been used recently. We can distinguish sufficiently successful use different techniques in marketing based on model designs, and calculation formulas used during market research, designing distribution channels, pricing policies and the study of consumer behavior (Gomol's'ka, 2006). There is plenty of arguments that suggest that the number of companies and organizations use in their quantitative modeling of market situations will continue to grow. However, a management decision not to operate only the results of quantitative analysis. Most marketing management problems can be solved based on numeric data. Even in cases where quantitative analysis in decision-making plays a major role, the system focuses on the use of mathematical methods alone will never be able to provide marketing information sufficient. Therefore, the market research along with quantitative widely used qualitative study of phenomena and processes. Qualitative research (interviews, group discussions, Delphi method, etc.) Make it possible to explain – what motivates consumers when purchasing goods on which motifs taken their purchasing decisions, etc. A hypothesis to explain these phenomena, then thoroughly examined using quantitative models.

In some cases, the use of models in marketing research makes it nimble results. This leads to the underutilization of simulation tools in practice marketing. We can explain this to several factors. In particular, the fact that most models in marketing is based on a methodology that is characteristic of marketing theory and difficult to quantify. Level meaningful representations of the object of study in marketing is not always sufficient in terms of its formal description, it is caused by the specifics of the object and susceptible to many stochastic parameters. This makes it difficult to build a productive model. In addition, many models are designed for mass practical application in marketing activities require significant effort on the part of management personnel, specialized training and skills of staff, which do not always have marketers. Simulation provides direct marketing effect only when the model allows for certain advantages in the design and implementation of management decisions. For example, increases in sales of goods or services, promotes savings and elimination of others.

It should take into account not only direct but also indirect value of projected marketing models. This form of manifestation of their outcome contributes to clarification of content concepts, identify relationships between observable phenomena, their interdependence, etc. An important prerequisite for analytical modeling capabilities in marketing is the principle of simplification image of the object of study. In the practice of marketing research are quite popular, so-called matrix model «Boston Consulting Group» model «Ansoff» matrix «competitiveness – the stage of product life cycle» and others. (Bakushevich, & Gevko, 2009). They are used to study the market situation, analysis of product portfolio, product positioning in the market. One can hardly call them complex in terms of methods used and the object of study. They are available for the analysis and comparison of the studied phenomena and processes.

Depending on the choice of simulation models are differentiated on the abstract (conceptual) and material (physical). In marketing and use abstract and material model. For example, the material used to construct a model of reduced models of the research object, this simulators for testing the quality of the goods, the various analog model (electrical, hydraulic, mechanical). With these models simulated the effect of different marketing options, dynamic elements of the marketing mix and studied consumer behavior. However, it is clear that such models are more demonstrative in nature, are quite expensive and not widely used.

Economic-mathematical model is a mathematical description of the studied economic process or object. This model is a concentrated expression of the general relationships and patterns of economic phenomena in mathematical form. Most mathematical economic models includes a system of equations, inequalities, consisting of a set of variables and parameters. Variables describing, for example, sales of goods (works, services), marketing costs, the costs of promoting products on the market and others, and settings – Rate of advertising time on marketing activities. In addition, virtually every model can identify external variables – their values are determined outside the model, and they are considered to be given; and internal variables whose values are determined by the study of the model.

Economic and mathematical models are divided into descriptive and optimization.

Descriptive models are the formalization of the phenomenon using mathematical tools; used for further study of the economic system and the relationship of its elements. These include the diversity of matrix models, production functions. These models are useful for analytical and predictive marketing. They help to describe the relationship between the volume of sales, marketing costs and profit.

Optimization models are descriptive in mathematical form reflect the content of economic problems, but they are distinguished by the presence of the conditions of the optimal solution, which is written as functional. These models under certain initial data problem allowing marketers to get a lot of solutions satisfying the problem (so-called feasible solutions), and provide a selection of optimal solutions that meet the criterion of optimality. Managerial decisions made by marketers in most cases are optimization character. Decision-marketing solution includes: statement of purpose, analysis of alternatives and environmental factors that influence the decision, search for the optimal result. As an objective may be, for example, increase profits, turnover rate, share in the segment, increasing loyalty to the product. Controlled variables are the components of the marketing mix (product, price, distribution, communication). Market environment characterized by uncontrollable parameters (competition, climatic conditions, cultural and demographic factors, etc.). The degree of achievement of goals under the given constraints of marketing environment characterized by the adoption of marketing decision (Golubkov, 1999).

Mathematical modeling of market research is rather complex, it is caused by:

- complexity of the object of study, nonlinearity marketing processes, the presence of threshold effects, such as minimum sales promotion, temporary setbacks;
- interaction effect of marketing variables which are for the most part interdependent and interrelated, such as price, range, quality and output;
- complexity of measuring marketing variables. It is difficult to measure consumer response to certain stimulus, such as advertising. So often used indirect methods, such as registration of cases returning the product to determine the veracity of advertising;
- instability marketing relationships due to changes in tastes, habits, ratings, etc. ;
- relative incompatibility mentality personnel engaged in practical marketing, on the one hand, and the use of quantitative methods in marketing research, on the other. The first priority is given to informal methods, the second – mathematical modeling.

So mathematics extreme should coincide with the economic optimum. These models are used to optimize distribution channels. So, if there are certain ratio between sales and number of customers (clients), then optimize goods to be procured in the distribution channels can be based on analysis of sales growth, such as a year, ranking buyers (customers), depending on the amount of their purchases. However, these models characterized by strict formulation and quantification of parameters, which narrows the scope of their application in marketing activities.

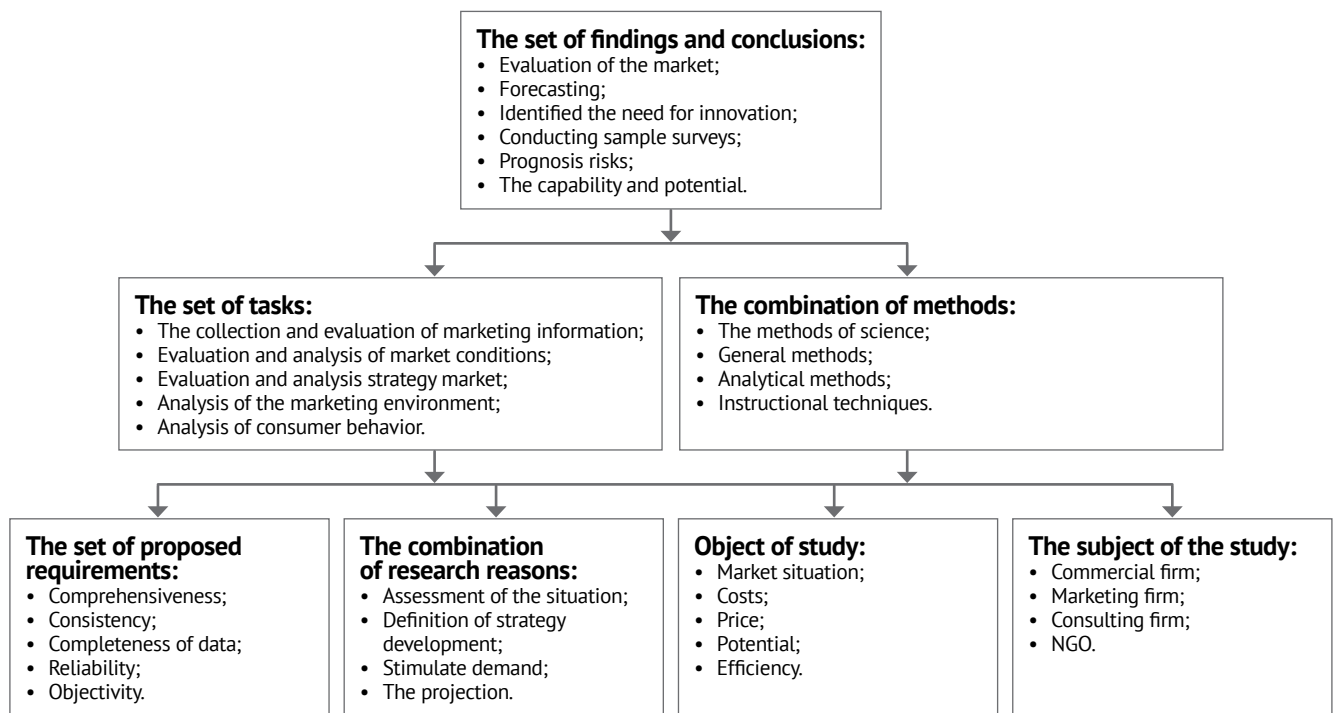


Fig. 1 Integrated Model of Marketing Research

A special place in the statistical models occupy and econometric models of market activity, which is a system of mathematical relations describing certain socio-economic object, process or phenomenon. In marketing research are quite widely used simulation models that reproduce the operation processes of the object. It also uses linear programming model, particularly in solving transportation problems. Consider a comprehensive model of marketing research.

Any model is based on certain principles, so market research should observe the following principles:

- Scientific, i.e., explanation and prediction market studied phenomena and processes based on scientific principles and objective of the data and identify patterns of these phenomena and processes;
- Consistency, i.e. the allocation of individual structural elements constituting phenomena detection and hierarchical degree of subordination;
- Complexity, including the study of phenomena and processes in their entirety, and relationship development;
- Accuracy, i.e. obtaining adequate data by providing scientific principles of collection and processing, the exclusion bias in the estimates careful monitoring, the use of computers and created a science research tools;
- Objectivity – the requirement to take into account possible errors measuring a phenomenon not adjust the facts under predetermined scheme, be careful in interpreting the facts;
- Initiative, that exercise creativity, taking initiative, finding new, innovative ways to study: conservatism is contraindicated to marketing research;
- Effectiveness, i.e. the achievement of the objectives put forward, comparing the results with the cost.

Marketers are actively using graphs, charts, drawings, characteristic graphical modeling of objects and models that allow to calculate the rate of market share, and the factors that influence its dynamics. Widely known graphic representation of the product life cycle; Depending on the quantity of goods supplied to the market, and prices for them, while maintaining the other parameters constant (supply curve); graphic representation of the dependence of demand the price level, showing that the quantities to be purchased in the marketplace for a fixed period at different prices for this product and maintaining the other parameters constant (the demand curve) (Bazilevich, 2004). Marketers may also

be interested graphical representation of communication between the volume of sales or services and money spent on advertising. These charts will answer the question of whether these links causal in nature or have a statistical nature. What degree of influence of various factors on these processes?

Abstract models can display the internal structure of the object of study and reproduce relations among its elements. This is typical of many mathematical model and the first decomposition models. In the practice of marketing research can be applied on the assumption that all model elements inherent lack of interest that are not derived from the common goal. That is, each element of the marketing mix chooses their behavior in accordance with any prescribed it for optimality criterion. Focusing on this criterion provides capacity-wide value function given a priori to test the process. Arguably, the formal self-regulation each item actually is not capable of self-organization and dismemberment model into multiple segments corresponding to its elements is carried out independently of subsequent coordination results. It is important to formulate a research problem, formalize them and provide the possibility of mutual balancing local decisions to implement procedures for coordination of these decisions.

If the data decomposition prerequisites are not met for modeling real object of study, it uses compositional approach. Based on the existing structure of the facility and explication real intrinsic interest of its elements, is predicted behavior of the investigated object based self elements. The phenomenon of self-organization is taken into account explicitly or implicitly, based on the fact that elements of object modeling has its own interests, which are not derived from the common goal. If these interests can be described quantitatively with satisfactory accuracy for this study, such a description can be regarded as an independent regulatory optimization. This kind of perspective model of the object. If this is not possible, the development of the object appears as a descriptive model. Thus, a model designed to determine the state of the object that are perfect in any sense or acceptable in terms of the subject simulation, called prescriptive (Vojchak, & Fedorchenko, 2007).

If information about the study is incomplete and the internal structure of the object is not available or is not subject to investigation structuring, the model reflects only conduct or operation of the facility, determining its effects on the relationship between him and his condition. This model is called «black box». This type of cybernetic model used when there is no information on the internal organization and behavior of the simulated object. For example, consumer behavior can be seen in the context of the model of the «black box». One kind model of «black box» model is the «stimulus – response» that is used to identify the behavior of consumers in order to account for these features when making marketing decisions. While this model provides a rather simplistic explanation of consumer behavior, though it can help the researcher is able to trace the connection between stimuli: external and internal stimuli consumers and the changes taking place in consumer behavior. In the process of this model is not always possible to determine how marketing stimuli affect consumers and why they react. In this case, the researcher is able to record signals arriving at the «entrance» of the system as a whole, and in some cases ask the signals and analyze the reactions of the research object because of «exit». Consequently, the impact on consumer marketing is carried out by the entire set of communication marketing tools.

Objects modeling in marketing are potentially infinite variety of relationships with the environment because they are characterized by a set of «inputs» that creates or selects registration researcher. The result depends on the arsenal of measurement tools and opportunities for their use, methods of collection and processing of marketing information, the influence of the researcher on the «black box». Methods of selection and character sequences influence the researcher «black box» theory developed in the experimental design. Thus, the need for model «black box» arises when dealing with the processes occurring in the environment or facility management of its operations, the description of which we can use information about the internal structure of the process.

The global transformation in many markets led to the development of verbal modeling in marketing, which can influence the object of study by means of associative chains and by association test words. The effect of the words used in advertising, names and brand products is investigated. Marketers are based on the fact that people constantly make verbal model different objects and phenomena and are guided with them in making decisions. The more established model, the better ceteris paribus person will solve the problem. With verbal models marketers trying to uncover the true feelings of consumers using the conclusions Selecting advertising illustrations for brochures, pictures on the package of subjects for promotional videos. Abstract verbal modeling using computers due to the rapid development of digital technology, the introduction of modern information and telecommunication products.

Marketing via verbal model modifies the traditional marketing mix by borrowing marketing approaches its development with very different business areas. «Borrowing» of the marketing of other products or services enables it to formulate a new formula and thus provide lateral shift not only in relation to the product, but also to pricing, distribution, elements of communication.

To assess the security infrastructure of the region, we suggest using five methodological approaches: entropy, target, econometric, balance and heuristic. Entropy approach is based on an assessment of the adequacy of the townspeople minimum below which normal functioning becomes impossible (there is habitat destruction). As a mathematical model in this case, you can use the Durbin-Watson statistic:

$$DW = \frac{\sum(l_{t+1} - l_t)^2}{\sum l_t^2} \tag{1}$$

when , $l_t = y_t - \hat{y}_t$ (2)

where DW – Durbin-Watson coefficient;

y_t – actual level of infrastructure provision t -type townspeople;

\hat{y}_t – the minimum allowable level of infrastructure provision t -type townspeople;

l_t – deviation of actual infrastructure provision t -type of minimally acceptable in the base period;

l_{t+1} – deviations in the period measured.

With the value of DW , which is close to zero, we can talk about stabilizing the infrastructure provision; at $DW > 1$, we can state the presence of significant improvements in infrastructure provision citizens. Since using the least squares method to calculate l_t and l_{t+1} eliminates significant figures (counted only the absolute value deviations), Durbin-Watson statistic should be supplemented by detailed analysis of deviations, especially in the presence of negative trends in infrastructure provision.

In assessing infrastructure availability target method of analysis involves the study of the degree of objectives achievement in citizens

infrastructure. Usually it is used in assessing the development and infrastructure sector in the region. In the most general form analytical interpretation of this method can be represented by the type of objective function:

$$\sum_t \sum_j y_{ij} \times k_j \longrightarrow \max \tag{3}$$

when $\sum_j k_j = K$ (4)

$$y_{ij} = \frac{Q_i(t+1)}{k_i(t+1)} / \frac{Q_i(t)}{k_i(t)} \tag{5}$$

where y_{ij} – level of j-th group of citizens services security i-th species;

K_j – the number of residents in the j-th group;

C – total number of citizens;

$Q_i(t)$ $Q_i(t+1)$ – volume of i-type services provided to citizens in the baseline (t) and estimating (t+1) periods;

n – range of infrastructure services sector;

m – number of residents on the nature of consumption services infrastructure sector.

If in the objective function (equation 3) replace the max mark on the program established infrastructure security value, you can always compare (assess) the degree of approximation (achieve) the goal. If there are significant deviations from the goals of security infrastructure necessary to conduct a detailed analysis of the factors affecting the availability of infrastructure and audit purposes. In the latter case, the transformation of possible targets is available based on objective reality in the infrastructure sector in the region.

Economic evaluation model of infrastructure provision are built to describe the main trends in the field of citizens life. In our opinion, this case could reasonably use the formula exponential trend:

$$y_t = A \times e^{bt} \tag{6}$$

where y_t – the level of infrastructure provision in period t;

A – the minimum value of infrastructure provision citizens;

e – base of natural logarithm;

bt – the average rate of change of the time series in period t.

For parameter estimation exponential trend rather go to the log:

$$\ln y_t = bt + \ln A \tag{7}$$

and apply the method of least squares. However, remember that the operation logarithm implicitly assumes multiplicative post random variations in trend.

If deviations are added, the trend estimate the parameters obtained in this way, will be shifted. Therefore, the main difficulty in using economic methods of evaluation of infrastructure provision citizens is to collect and reliability of information over a longer period of time (at least 10 years).

With instability socio-economic situation in the Ukrainian society the use of economic models becomes problematic.

Equity method of infrastructure provision evaluation is based on determining the loss of infrastructure insecurity:

$$\text{Pin} = \sum_t \sum_j q_{ij} \times k_i \tag{8}$$

$$\text{In}q_{ij} = \alpha_{ij} (1 - y_{ij}) \tag{9}$$

where Pin – loss of infrastructure insecurity of citizens;

α_{ij} – specific losses on each item of infrastructure insecurity j-th group of townspeople t-th type of service;

q_{ij} – loss of infrastructure insecurity t-th type of service j-th group of citizens.

Conclusions. Based on the above we can conclude that a variety of types of modeling used in marketing, describes the types of models are not new, but rather the scope, direction, equal opportunities, especially the application. The formalization of marketing processes and their modeling are not the purpose of research, but a mean to achieve economically viable results.

The basis of regional marketing is planned and systematic study of the state and trends of the region in order to take decisions about regional market segmentation, target market selection, justification marketing strategy to market, development of the marketing mix and more.

References:

1. Bagiev, G. L. (Eds.). (1999). *Marketing* [Marketing]. Moscow: Economy.
2. Bakushevich, I. V. & Gevko, V. L. (2009). Planuvannja marketingovih doslidzhen' na pidpriyemstvah [Planning for market research companies]. *Marketing v Ukraïni*, 3, 22–23.
3. Balakireva, O. N. & Romat E. V. (1999). Kak provodit' marketingovoe issledovanie (Kak organizovat' marketingovoe issledovanie?) [How to conduct market research (How to organize a marketing research?)]. *Marketing i reklama*, 2, 23-25.
4. Bazilevich, V. D. (2004). *Formation of the competitive environment in transitive economy: Theoretical aspects*. Zaporozhye: ZIGMU.
5. Craig, C. S., & Douglas, S. P. (2005). *International marketing research*. Chichester: John Wiley & Sons.
6. Eriashvili, N. D. Howard, K., & Zipkin, Y. A. (2000). *Marketing* [Marketing]. Moscow: UNITY - DANA.

7. Fedorchenko, A. V. (2003). *Sistema marketingovikh doslidzhen': monografiia* [System Marketing Research: Monograph]. Kyiv: KNEU.
8. Golubkov, E. P. (1999). *Osnovy marketinga* [Principles of Marketing]. Moscow: Finpress.
9. Golubkov, E. P. (2000). *Marketingovye issledovaniia: teoriia, metodologiia i praktika* [Marketing research: theory, methodology and practice]. Moscow: Finpress.
10. Gomol's'ka, V. V. (2006). Regional'nij marketing jak zasib pidvishhennja investicijnoyi privablivosti teritorij [Regional marketing as a means to increase the investment attractiveness of areas]. *Regional'na ekonomika*, 4, 158–164.
11. Kotler, F. (1999). *Upravlenie marketingom* [Marketing management]. St. Petersburg: Peter.
12. Pasternak, O. I. (2000). *Ekonomicheskoe razvitie regiona: marketing programmnoho obespecheniia: Monografiia*. [Economic development of the region: marketing software: monograph]. Lviv: Institute for Regional Studies.
13. Sinetska, O. E. (2000). Stages and processes of integrated marketing research is a manufacturing company. *Theories micro-macroeconomics: Scientific Papers (pp. 89-98). Issue 5*. Kyiv: Akademiya munitsypal'noho upravlinnya.
14. Skibins'kij, S. V. (2005). *Marketing: uchebnik. Chast' I* [Marketing: tutorial. Part I]. Kyiv: KNEU.
15. Starostina, A. O. (1998). *Marketingovye Issledovaniia. Prakticheskii aspekt* [Marketing Research. The practical aspect]. Moscow: Williams.
16. Starostina, A. O. (1997). Marketingovye issledovaniia rynku promyshlennoi produkcii [Market research in the market of industrial products]. *Promyshlenni marketing. Teoriia i ekonomicheskaia situatsiia*. Kyiv: Ivan Fedorov.
17. Tkachenko, L. (2003). *Marketing poslug* [Marketing services]. Kyiv: Center textbooks.
18. Vojchak, A. V. & Fedorchenko, A. V. (2007). *Issledovanie rynku: Uchebnoe posobie* [Market research: Textbook]. Kyiv: KNEU.