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METHODOLOGICAL PRINCIPLES IN STATISTIC STUDY OF TOURIST MARKET

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The article reveals the fundamental principles and essence of market statistics of tourism product. It receals detailed analysis of the problem and the system of basic indicators as a methodology and statistical evaluation and analysis of tourist activities, as well as its competitiveness at different levels. All the indicators are the foundation of the knowledge base needed to make management decisions.

Key words: Quantity, value of a particular quantity. Absolute and relative quantities. Power average and structural quantities. System of statistical indicators.

МЕТОДОЛОГІЧНІ ЗАСАДИ СТАТИСТИЧНОГО ВИВЧЕННЯ РИНКУ ТУРИСТСЬКОГО ПРОДУКТУ

У статті розкриті основоположні принципи та сутність статистики ринку туристського продукту. Детально розглянуті задачі та система основних показників як методологія статистичної оцінки і аналізу туристської діяльності, а також її конкурентоспроможності на різних рівнях. Усі представлені показники є фундаментом інформаційної бази, необхідної щодо прийняття управлінських рішень.

Ключові слова: Величина, значення конкретної величини. Абсолютні, відносні величини. Степеневі середні і структурні величини. Система статистичних показників.

МЕТОДОЛОГИЧЕСКИЕ ОСНОВЫ СТАТИСТИЧЕСКОГО ИЗУЧЕНИЯ РЫНКА ТУРИСТСКОГО ПРОДУКТА

В статье раскрыты основополагающие принципы и сущность статистики рынка туристского продукта. Детально рассмотрены задачи и система основных показателей как методология статистической оценки и анализа туристской деятельности, а также ее конкурентоспособности на различных уровнях. Все представленные показатели являются фундаментом информационной базы, необходимой для принятия управленческих решений.

Ключевые слова: Величина, значение конкретной величины. Абсолютные, относительные величины. Степенные средние и структурные величины. Система статистических показателей.

The problem to be considered. With the development of the global economy the influence of tourism shows a substantial growth and is continuously exerted on both the global and the national economy. Tourism is being transformed into a major independent industry of the national economy. It becomes one of the subjects of the global integration processes. According to the UNWTO forecasts for the growth rates in tourism will prevail in the nearest decades [6].

As a science, statistics deals with objective regularities and patterns of social phenomena development, and, therefore, statistical methods are used actually in all areas of social life featured by mass nature of the phenomena and, inter alia, in tourism.

The relevance of statistical research of tourism is explained by the need to obtain unbiased and reliable information about the condition of tourism and its development, tourist industry and to estimate its contribution into the total gross domestic product. The relevance of statistical research is also explained by the necessity to evaluate the tourist flows, the loads produced on tourist resources and on tourist industry facilities, to evaluate the satisfaction of tourists' demand and the correlation between the consumers' expectations and the supply in the tourist market.

The analysis of the latest researches and publications. Methodical and practical issues of statistic research of the tourist product market became the main topic in the works of such famous economists as: O. O.Vishnevskaya, V. J. Gelman, V. V. Grinenko, T. E. Karmanova, O. V. Kaurova, V. A. Kvartalnov, G. V. Kovalevskiy, A. N. Maloletko, A. J. Parfinenko, V .I. Sidorov, E. A. Soboleva et al. [1; 2; 3; 5].

The main subject of the article. The necessity to use statistic methodology to estimate the main tendencies in the development of tourist product market is outlined.

The basic part. Statistical indicators are expressed in absolute, relative and average statistical quantities.

Quantity is a characteristic of the object or a phenomenon of a material world, common in qualitative terms but it is individual for every object in quantitative terms.

Value of a particular quantity is its estimate obtained by multiplying a particular figure by the unit adopted for such quantity.

The initial form of expression of a statistical indicator is represented by absolute quantities. Individual absolute quantities characterize the absolute dimensions or properties of a studied phenomenon for each measured unit. If indicators characterize the whole set, they are referred to generalizing absolute indicators. Absolute indicators always have units of measure: physical or cost units (rubles, dollars, euro etc.).

Simple physical units of measure are meter, liter, kg, etc.

Compound physical units of measure are estimated indicators obtained as a result of multiplying two or several indicators having ordinary measurement units: man-days, watt-hours, etc.

Conditional physical measurement units are used in the instances where it is necessary to obtain a final value of indicators of the same type which are not directly comparable.

However, rather frequently absolute values are not able to give an analytical description for a process or phenomenon under study. In this case relative statistical values are used. They serve analytical purposes: they enable a researcher to compare the dimensions of the phenomena, to evaluate their dynamics and changes in structure.

Relative values are always obtained as a quotient of two absolute quantities. If absolute quantities are homonymous, then the obtained relative quantity is expressed in factors, percent (multiplied by 100), per mille (multiplied by 1000). If absolute values are not homonymous their relation shall be a relative value, which has a compound unit of measurement: centner/hectare, m^2/person, etc.

Types of relative indicators:

Relative value of target (RVT):

$$\text{RVT} = \frac{\text{Target value of indicator}}{\text{Indicator level in the baseline period}} \times 100$$

Indicator level in the baseline period

Relative value of target achieved (RVTA):

$$\text{RVTA} = \frac{\text{Actually achieved level of indicator in the given period}}{\text{Target level of indicator}} \times 100$$

Relative dynamics value (RDV):

$$RDV = \frac{\textit{Actually achieved level of indicator in the current period}}{\textit{Actual level of indicator in the baseline period}} \times 100$$

This is the interrelation between these three indicators: $RDV = RTV \times RVTA$.

Relative value of structure (RVS, shows a specific weight, a share of each part as a whole):

$$RVS = \frac{Part}{Whole} \times 100$$

Relative coordination value (RCV, shows how many units of the 1st part accounts per one unit of the 2nd part):

$$RCV = \frac{1st\ part}{2nd\ part} \times 100$$

Relative intensity value (RIV, describes the density of phenomena distribution within the given environment — demographical coefficients). For example:

$$\hat{E}_{BIRTH} = \frac{Number\ of\ new\text{-}born\ persons\ per\ year}{Average\ annual\ number\ of\ population} \times 100$$

Relative comparison value (RCV) is a ratio between the absolute homonymous indicators referred to different locations or objects.

The most commonly used form of statistical indicators is the average value.

Average value $\bar{x}$ is a generalized quantitative description of a certain character in the statistical population under particular conditions of place and time.

Average value reflects specific, typical and actual levels of phenomena under study; it characterizes such levels and their changes in time and space. It is calculated solely for those populations that include qualitatively homogenous units.

Depending on a particular purpose of research and the nature of data there may be used different types of means: arithmetic, harmonic, geometrical, quadratic and other types of structural means.

Arithmetic, harmonic, geometrical and average quadratic means are classified into a common group named *exponential means*. Formulas for their calculation may be transformed into the general formula as follows:

$$\bar{x} = \sqrt[m]{\frac{\sum \tilde{o} \frac{m}{i} f_i}{\sum f_i}},$$

where m is the exponent of mean: at m = 1 we obtain the formula for calculation of arithmetic mean; at m = 0, for geometrical mean; at m = −1, for harmonic mean, at m = 2, for quadratic mean;

x_i are options (of value assigned to the character);

f_i are occurrences (number of units of observation that have the value of the given variant).

Arithmetic mean value is used when the gap between the minimal and top values of character is small.

Simple value is calculated for loose data or for grouped data with equal occurrence rates.

Weighted value is calculated for grouped data with uneven occurrence rates.

Simple arithmetic mean:

$$\bar{x} = \frac{\sum x_i}{n}.$$

Weighted arithmetic mean:

$$\bar{x} = \frac{\sum x_i \times f_i}{\sum f_i}.$$

Main properties of arithmetic mean:

• the amount of the character variances from its arithmetic mean is equal to zero;

• when all values of character are decreased (increased) A times the average arithmetic mean will accordingly decrease (increase) the same A times;

• if the occurrence rate of each value of the character decreases or increases m times the value of arithmetic mean will not change.

Properties of arithmetic mean are based upon one of the methods used for its calculation, the method of moments.

The method of moments is a method of counting from conditional zero.

This method is acceptable solely for sequences with equal intervals.

$$x = \bar{x}'d + c,$$

where $\bar{x}$ is a moment of the first order.

$$\bar{x}' = \frac{\sum \left(\frac{x_i - c}{d} \right) f_i}{\sum f_i},$$

where *d* is the interval value;

c is the value of the middle of the interval which is in the center of the sequence.

The harmonic mean is calculated when the values of occurrences are unknown but products of the variants and the appropriate occurrences are known.

$$F_i = x_i \times f_i \ .$$

Simple harmonic value:

$$\overline{x}_{SIM} = \frac{n}{\sum \frac{1}{x_i}}$$

Weighted harmonic value:

$$\overline{x}_{WTD} = \frac{\sum F_i}{\sum \frac{F_i}{x_i}}$$

Geometrical mean is calculated either when the minimal and maximum value of a character differ from each other substantially or when we have data in the form of a ratio of two indicators (indices or growth ratios).

The simple geometrical mean is used for loose data (when occurrences are missing) or for grouped data with equal occurrences:

$$\overline{x}_{geom} = \sqrt[n]{x_1 x_2 x_3 ... x_n} \ .$$

For grouping data with uneven occurrences the geometrical weighted mean is used:

$$\overline{x}_{GEOM.WTD} = \sqrt[n]{(x_1)^{f_1} (x_2)^{f_2} (x_3)^{f^i} ... (x_n)^{f_n}}$$

Quadratic mean and cubic mean are calculated when it is required to calculate the average size of a character expressed in quadratic or cubic units of measure.
simple quadratic mean

$$\overline{x}_{GUAD.SIM} = \sqrt{\frac{\sum x_i^2}{n}};$$

weighted quadratic mean

$$\overline{x}_{GUAD.WTD} = \sqrt{\frac{\sum x_i^2 f_i}{f_i}}$$

simple cubic mean

$$\overline{x}_{CUB.SIM} = \sqrt[3]{\frac{\sum x^3}{n}};$$

weighted cubic mean

$$\overline{x}_{CUB.WTD} = \sqrt[3]{\frac{\sum x^3 f_i}{f_i}}$$

Structural means are used for study of the internal composition and structure of the distributed sequences of character values.

Mode (Mo) is the most frequently used occurring value of a character or a value of a variant with a highest occurrence rate.

If there exists a sequence of data, which are presented as intervals, it is required to calculate, first of all, the modal interval, that is the interval with a highest occurrence, and then the following calculation shall be made:

$$Mo = X_{MO} + d_{MO} \frac{f_{MO} - f_{MO-1}}{(f_{MO} - f_{MO-1}) + (f_{MO} - f_{MO+1})},$$

where X_{Mo} is the lower boundary of the modal interval;

d_{MO} is the interval value;

f_{MO} is the frequency of the modal value;

f_{MO-1} is the frequency of the interval, which precedes the modal interval;

f_{MO+1} is the frequency of the interval, which follows the modal interval.

Median (Me) is the value of the variant in the center of the population character values arranged in ascending order. The median divides the sequence of values into two equal parts.

To calculate the median, it is necessary to find its ordinal number by the following formula:

$$N_{ME} = \frac{n+1}{2}.$$

where *n* is the volume of the population.

Median will be the value of the variant which is directly under the median No.To obtain the median in the interval sequences it is necessary, first of all, to calculate the median interval by the following formula:

$$N_{Me} = \frac{n}{2}.$$

Then, on the basis of the accrued occurrence rate (the amount of all previous occurrence rates), it is necessary to determine the interval the median value of the character belongs to. The median is directly calculated by the formula:

$$Me = X_{Me} + d_{Me} \frac{\frac{\sum f}{2} - S_{Me-1}}{f_{Me}},$$

where X_{Me} is the lower limit of median interval;

d_{Me} is the value of the median interval;

S_{Me-1} is the sum of the accrued occurrence rates of the interval preceding the median interval;

f_{Me} is the frequency of the median interval.

Conclusions. Thus, there is a set of statistical indicators varying in purpose, methods and tasks of estimates, as well as in the designated area of use.

The set of such inter-related indicators applicable to specific areas or processes of the social life is called the system of statistical indicators. The system of statistical indicators covers all aspects of life of the human society at various levels: at the country level, at the region level (macrolevel) or at the level of tourist enterprises (microlevel).

The types and forms of such systems are rather diverse and depend on a particular task and complexity of objects under study.

In the process of realization of the set tasks of survey the tourism statistics uses the relative indicators, quantitative and qualitative characteristics of these phenomena and processes that in total and in different combinations generate the tourist market. These indicators are designed to reflect the condition, development and stability of the market at various levels, in time and in space (geographic and social and economic) [1, p. 203 – 219].

Each particular branch of statistics works out its specific indicators, which should be interconnected and represent a complete and logical system making it possible to study in detail the social and economic process and to obtain valid statistical data. Interrelation and links of the social and economic phenomena and processes determine the links between statistical indicators.

The system of statistical indicators is based on economic and social categories of the tourist market. These include services, tourist product, demand, price, offer, distribution costs, profit from sale of services.

The set of indicators of the tourist market is a set of interconnected and internally consistent indicators describing the key economic processes and the economy as a whole. The internal consistency of the indicators makes it possible to use them in a combination and also to calculate various derivative coefficients for analytical purposes.

For development of the tourist market it is necessary to perform, apart from the overall basic and economic analysis, a detailed analysis of various data, including:

- infrastructure of the region;
- tourist sights and types of tourist activities;
- condition of tourist facilities and services;
- the existing and potential forms of tourism;
- various tourist market segments;
- environmental condition of the region;
- social and cultural aspects;
- institutional elements.

In a number of areas, tourism affects the national economy as a whole. In entrepreneurial activities creation of a tourist enterprise generates benefit, as it provides tourist product, services to consumers, jobs and wages are provided to the employees; the founders receive profit; the government and the region budget collect taxes and charges. In consumer segment, the tourists' demand for various merchandise and services facilitates the development of local production and improved living standards of population. In the currency exchange sector, tourism generates substantial inflows of foreign currency. The tourist infrastructure also develops and this can be used by the local population as well.

In relation to tourism it is expedient to consider the following groups of statistical indicators: social and economic indicators; indicators of tourism development, particular indicators describing activities of tourist enterprises.

To a certain extent social and economic indicators are measurers of development of different branches of industry and types of services, including tourist services. They serve the basis of the opinions on the position held by a country or region in the economy, the basis for the initial valuation of the economic and human potential. To a certain extent indicators serve a basis of social and economic forecast of any activity development.

The major indicators of the state social and economic policy are:

- area of the territory;
- population [1, p. 560 – 569];
- gross domestic product (GDP);
- volume of exported products;
- average annual number of population employed;
- average annual unemployed population;
- monthly average wages;
- cash income of the population;
- cash expenses of the population;
- average level of education.

The unified indicator reflecting the level of economic development of the regions may also serve as the indicator of development. Such indicator used in the international practice of inter – country comparison, is the index of development of human potential. It is calculated on the basis of three indixes: longevity, educational level (including literacy of adult population) and the gross domestic product per capita.

Indicators of tourism development provide information about condition of the tourist industry and tourist resources. The list of the key tourism indicators is selected by experts chosen for description of the tourist potential of the administrative and territorial unit.

Individual indicators characterize an object or a particular observation unit in the area of tourism: a hotel, a travel agency, a tourist. Individual indicators are presented in forms of statistical reporting and in other forms of observation. On the basis of individual statistical indicators the consolidated absolute and relative indicators are calculated that constitute the basis for information data base required for taking management decisions [4].

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