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METHODOLOGICAL ANALYSIS OF INTERNATIONAL AND NATIONAL TOURISM BY MEANS OF GENERALIZING STATISTICAL INDICATORS

Kushchenko O.I.
Kharkiv V.N. Karazin National University

The article reveals the fundamental principles and essence of market statistics tourism product. It considers detailed the system of basic indicators as a methodology of statistical evaluation and analysis of tourist activities, as well as its competitiveness at different levels. The article is a continuation of the previously published work on methodological basics of tourism statistics [1, p. 70-73]. In this case, statistical evaluation covers international and domestic tourism. International tourism development indicators are important to develop strategies and tactics of the tourism product of the country. Intelligently chosen to analyze the statistical methods are always successful. All given indicators make the foundation of the knowledge base needed to make management decisions in the field of tourism industry.
Keywords: variation analysis, index analysis, dynamic sequences, seasonal fluctuations in tourism.

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 [2].

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 questions of statistic research of the tourist product market became the main topic in the works of such famous economists as: I.M. Biletskaya, O.O. Vishnevskaya, V.J. Gelman, V.V. Grinenko, T.E. Karmanova, O.V. Kaurova, V.A. Kvartalnov, S.Ya. Kovalchuk, G.V. Kovalevskiy, O.O. Ljubiceva, A.N. Maloletko, A.J. Parfinenko, V.I. Sidorov, E.A. Soboleva, V.M. Tsikhanovskaya et al [3; 4; 5].

The analysis of literature showed that authors mainly used statistical information given by different services of statistics, but does not give methodology of calculation of statistical indexes. Such position defined actuality of preparation of this article.

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. Methodological bases of statistics of tourism were already published by an author [6, p. 171-174]. This article is continuation.

The basic part. During the statistical analysis, a situation may occur when the mean values are similar, when the underlying set used for their computation contains units which values differ from each other substantially.

It is obvious that the mean values in the first and second cases are similar, however, it is clear that the first and second sets are qualitatively heterogeneous, i.e., the variation of values in characters within them is different. Variation analysis investigates this problem.

Variation is a difference in values of a character in different units of a given set, or population, within the same period or a moment of time.

Discordant observations imply radically varying characters.

Absolute indicators of variation:

Variation R-scope:

$$R = x_{\max} - x_{\min}$$

Mean linear variance ($\overline{d}$) is the arithmetic mean value calculated on the basis of the absolute values of variances in a character particular values from their mean value:

$$\overline{d_{sim}} = \frac{\sum |x_i - \overline{x}|}{n}; \quad \overline{d_{wtd}} = \frac{\sum |x_i - \overline{x}| f_i}{f_i}$$

Variance (σ^2) is a mean deviation square of variations deviations from their mean value:

$$\sigma^2_{sim} = \frac{\sum (x_i - \overline{x})^2}{n}; \quad \sigma^2_{wtd} = \frac{\sum (x_i - \overline{x})^2 f_i}{f_i}$$

Let us consider the variance behavior:

if $x_i = c$, where is a constant value, then $\overline{d} = 0$;

if we subtract constant value c from all character values, $\overline{d}$ will not change;

if we decrease all character individual values by d times, $\overline{d}$ will decrease by $\overline{d^2}$ times.

Below is the formula for computation of the variance in variational sequences with equal intervals by method of moments:

$$\sigma^2 = \frac{\sum \left(\frac{x_i - c}{d}\right) f_i^2}{\sum f_i} d^2 - \left(\overline{x} - c\right)^2$$

where c is the value of the class mark in a sequence centre;

d is the value of the interval.

Mean square deviation (standard deviation):

$$\sigma_{sim} = \sqrt{\frac{\sum\left(x_i - \bar{x}\right)^2}{n}}; \quad \sigma_{wtd} = \sqrt{\frac{\sum\left(x_i - \bar{x}\right)^2 f_i}{\sum f_i}}.$$

Variation comparative indicators.

In order to compare the same indicator for different sets, various comparative indicators of the variation shall be used.

Oscillation coefficient of $\left(V_R\right)$ reflects oscillatory nature of extreme values of a character around the mean value: $V_R = \frac{R}{\bar{x}}100$.

Relative linear deviation $\left(V_{\bar{d}}\right)$ describes a share of the averaged value of absolute deviations from the mean value: $V_{\bar{d}} = \frac{\bar{d}}{\bar{x}}100$.

Variation coefficient $\left(V_\sigma\right)$: $V_\sigma = \frac{\sigma}{\bar{x}}100$.

An aggregate shall be recognized to be quantitatively homogeneous if the variation coefficient does not exceed 33%.

Empirical determination coefficient $\left(\eta^2\right)$ describes the variance share resulting from intergroup character variation in the total variance of the indicator.

The total variance (describing the character values variation due to all factors) is computed.

Intergroup variances (describing the variation in values of the investigated character within the groups irrespective of the particular value of the group character) are calculated.

Intergroup variance (describing the variation of a character value due to the effect of the grouping character solely) is calculated as follows:

$$\delta^2 = \frac{\sum\left(\bar{x}_j - \bar{x}_{tot}\right)^2 n_i}{\sum n_i}.$$

The dependence exists between the mean value of the intergroup variances, intergroup variance and the total variance, i.e., «the rule of variances added»: $\sigma_{tot}{}^2 = \bar{\sigma}_j + \delta_j^2$.

Determination empirical coefficient is calculated as follows:

$$\eta^2 = \frac{\delta^2}{\sigma_{tot}^2}.$$

Empirical correlation ratio shows how close is the connection between the grouping and the resulting characters (it assumes values from zero to unity). It is calculated as a square root of the empirical determination coefficient.

If the connection is missing, the correlation ratio is equal to zero.

If the functional connection exists, the correlation ratio is equal to unity.

The State statistics service of Ukraine monthly publishes new data on a great variety of multiple indexes, which give a deeper understanding of the current state of economy and manufacturing sector. Indexes relate to the most commonly used statistical indicators.

Index is a comparative indicator describing a change in social and economic phenomenon in time or in locality, as against the target value and normal value or against a certain standard value.

Individual indexes are used to characterize the change of individual elements of a complex phenomenon. The individual index is a relative indicator describing the change in a particular element of a complex economic phenomenon.

The general index reflects the change in all elements of a complex phenomenon. Therewith, the complex phenomenon is understood as such statistical set of values where individual elements are not subject to summarizing directly.

Individual index of the physical volume of the product is calculated by the following formula:

$$i_q = \frac{q_1}{q_0}$$

General indexes of quantitative indicators.

Aggregate index of the product cost or the goods turnover:

$$I_{pq} = \frac{\sum p_1 q_1}{\sum p_0 q_0}.$$

This index shows at how many times the product cost has increased in the reporting period via the base period. By multiplying the result by 100 we obtain the percentage index of the product cost increase.

The aggregate index of the product physical volume is calculated as follows:

$$\overline{I_q} = \frac{\sum\left(\frac{q_1}{q_0}\right)q_0 p_0}{\sum q_0 p_0} = \frac{\sum i_q q_0 p_0}{\sum q_0 p_0} = \frac{\sum q_1 p_0}{\sum q_0 p_0}.$$

Index of the product output physical volume shows how many times the physical product output has increased or, if we multiply the result by 100, it shows its percentage increase in the reporting period against the base period.

Average harmonic weighed index of the physical volume of output:

$$\overline{I_p} = \frac{\sum p_1 q_1}{\sum\left(\frac{1}{i_p}\right)p_1 q_1}$$

Each qualitative indicator is connected with a particular volumetric indicator per unit of which it is calculated. Thus, such qualitative indicators as price p, cost z, and labour intensity t relate to the production output.

Paasche prices aggregate index formula is presented as follows:

$$I_p^P = \frac{\sum p_1 q_1}{\sum p_0 q_1}$$

Paasche price index shows how many times on average the price level has increased for the mass of goods sold in the reporting period or shows its growth in percentage in the reporting period against the base period.

Laspeyres aggregate index formula is presented as follows:

$$I_p^L - = \frac{\sum p_1 q_0}{\sum p_0 q_0} = \sum i_p d_{q_0 p_0}$$

E. Laspeyres proposed to calculate the price summary index with weighted functions repre-

sented by the amount of products manufactured in the base period.

Fisher «ideal» price index is presented as follows:

$$I_p^F = \sqrt{\frac{\sum p_1 q_0}{\sum p_0 q_0} \cdot \frac{\sum p_1 q_1}{\sum p_0 q_1}}.$$

In studying the average value dynamics, the task is to calculate the degree of the effect of the two factors: the changes in the averaged index values and the changes in the phenomenon structure. This task is performed by index method, i.e., by creation of the system of interconnected indexes into which variable structure indexes, constant structure indexes and structural shifts are included.

Variable structure index is presented as follows:

$$I_{\text{var .str.}} = \frac{\sum q_1 p_1}{\sum q_1} : \frac{\sum q_0 p_0}{\sum q_0} = \frac{\sum d_1 p_1}{\sum d_0 p_0}.$$

The fixed (constant) structure index takes account of changes in solely he indexed value and shows the average rate of change in reviewed value of the set units:

$$I_{fxd.str.} = \frac{\sum q_1 p_1}{\sum q_1} : \frac{\sum q_1 p_0}{\sum q_1} = \frac{\sum d_1 p_1}{\sum d_1 p_0} = \frac{\sum d_1 i_p}{\sum d_1} \quad \text{and}$$

if Σd=1, то $I_p^p = \sum d_1 i_p$

Index of the structural shifts characterizes the effect of the change in the studied phenomenon on the dynamics of the average level of the indexed indicator:

$$I_{str.sh.} = \frac{\sum q_1 p_0}{\sum q_1} : \frac{\sum q_0 p_0}{\sum q_0} = \frac{\sum p_0 d_1}{\sum p_0 d_0}$$

Chain and baseline indexes.

Chain indexes reflect the change of the indicator level in the current period as compared to the level of the previous period; baseline indexes, as compared to the baseline level, which is most often taken as the initial level of the dynamics sequence.

The product of chain indexes is equal to the baseline index value of the last period (the property of transitivity or of circular convergence of indexes). Consequently, the relation between the baseline index of the reporting period and the baseline index of the preceding period will allow obtaining the chain index of the reporting period.

All Paasche price indexes used the current period of weight functions (indexes with variable weights), while the physical volume indexes and Laspeyres price indexes use the fixed (indexes with constant weight functions) or the baseline one.

Analysis of dynamics sequences.

One of the most important purposes of statistics is studying analyzed indicators changes in time, i.e. their dynamics. This task is solved by means of analysis of dynamics sequences.

The dynamics sequence (or dynamical sequence) represents a sequence of numeric values of a statistical indicator, arranged in chronological order and describing the change in the given social phenomena in time.

The dynamical sequence always consists of the following two components: the moment or the period (t), in relation to which the statistical data is given, and the statistical indicator describing the amount of the examined phenomenon during the appropriate period and called as the «dynamical sequence level» (y).

Sequence levels are indicators whose numeric values form a dynamical sequence.

Time means moments or periods, to which levels are related.

Creation and analysis of the dynamics sequences allow identifying and measuring the regularities in social phenomena development in time. These regularities do not clearly express themselves on each particular level, but are shown solely in a trend, in a rather long-term dynamics. Different factors influence the general dynamics regularity, most often they are incidental and sometimes they have seasonal effects. Identification of the main trend in the level change is one of the key tasks in the analysis of the dynamics sequences.

For graphic presentation of a dynamic sequence, the time indicator t is marked on X-axis and the value of the studied attribute y is marked on Y-axis.

Depending on the contents of the time indicator, the dynamics sequences may be moment and interval ones.

The moment dynamics sequence is such a sequence, which levels characterize the condition of the phenomenon as of specific dates (moments).

The dynamic sequence, which levels characterize the amount of the phenomenon for a certain time interval (e.g., a month, a quarter, a year, etc.) is called the interval sequence.

Depending on the type of the statistical indicator, dynamic sequences are subdivided into the sequences of absolute, relative and average values.

Dynamic sequences of relative values may contain information on the change of specific weights of any indicator in the general set of objects during a specific period, the indicator growth during a specific period, etc.

Dynamic sequences of average values content information on the time change in the indicator, which is the average level of the reviewed phenomena. For example, average wages, average amount of credits granted by banks, etc.

Depending on the distance between the time indicators, dynamic sequences with equal and unequal time intervals are distinguished. Methods of the analysis of such series also differ.

In constructing the dynamic sequence, one should ensure its levels to meet the requirements of comparability, i.e. characterize the same object or the phenomenon, be related to the same territory and comparable period, and should be calculated by consistent methods with identical indicators measurement units.

Dynamic sequences can be represented graphically. The chart allows visualizing the phenomenon development in time and helps to analyze the levels. The most common graphic presentation (for analytical purposes) is the linear diagram created in the rectangular coordinate system.

Alongside with the linear diagram, for the dynamic sequences chart with a view of popularization, bar, sector, and other diagrams are widely used.

In creating dynamic sequences, specific rules should be observed. The main condition for obtaining correct results during the dynamic sequences

analysis and forecasting its levels is comparability of the dynamic sequences levels. The statistical data should be comparable by territory, the scope of covered objects, units of measurement, the registration time, prices, methods of calculation, etc.

In order to provide comparability of the data sequences it is necessary to present them in the same units of measurement.

It is quite evident that currency units of different countries and the currency units within one country in different periods (in case of the change of the currency exchange rate) are incomparable.

In some cases, incomparability can be eliminated by processing dynamic sequences by method, which is called joining dynamic sequences. This method allows overcoming the data incomparability occurring owing to a change of the range of the covered objects in time or the methods of indicators computation and obtaining a uniform sequence which is comparable in time. For example, we have two sequences of indicators describing dynamics of a phenomenon within new and old boundaries for the same range of objects, and such dynamic sequences may be linked together.

In studying of the social phenomena dynamics we encounter the problem of describing the intensity of change and calculation of the average dynamics indicators.

The analysis of dynamic sequences requires calculation of the following indicators:

– average level of dynamic sequences;

– absolute increments (chain and baseline, average absolute increment of growth);

– growth rates (chain and baseline, average growth rate);

– increase rates (chain and baseline, average increment of growth);

– absolute value of one per cent (1%) increase.

Chain and baseline indicators are calculated for describing the change of dynamic sequences levels and differ by baselines of comparison: chain indicators are calculated in relation to the previous level (variable baseline of comparison) and baseline indicators, to the level accepted as the baseline of comparison (constant baseline of comparison).

Chain and baseline absolute increases are interconnected: the sum of sequential chain absolute increases is equal to the baseline increase, i.e. to the total increase for the whole period.

Average indicators are generalized characteristics of dynamic sequences, and with their help the phenomenon development intensity is compared in relation to different objects, for example, by countries, branches, enterprises, etc.

The indicator values in specific moments or periods are called the dynamic sequences levels and are represented through yi (where i is the time indicator).

The procedure for calculation of the average level depends on the type of the dynamic sequences, namely, on whether it is a moment or an interval series, with equal or unequal time intervals between proximate dates.

If an interval sequence of absolute or average dynamic values with equal periods is given, the formula of simple arithmetic mean is used for calculation of the average level:

$$\bar{y} = \frac{\sum y}{n}.$$

If the moment series with equal time intervals is given, then the series average level is calculated by the formula of the simple chronological average:

$$\bar{y} = \frac{\frac{1}{2}y_1 + y_2 + \ldots + y_{n-1} + \ldots + \frac{1}{2}y_n}{n-1}$$

The chronological average is used when the moment dynamic sequences levels are not specific dates of change of the indicator under consideration.

Calculation of the sequences average level looses analytical meaning in case of a significant variability of the indicator within the sequences and in case of a radical change in the direction of the phenomena development.

Absolute increases are calculated as the difference between two values of the dynamic sequences proximate levels (chain increases) or as the difference between the values of the current level and the level accepted for the comparison baseline (baseline increases). Indicators of the absolute increase have the same measurement units, as the dynamic sequences levels; they show by how many units of own measurement the indicator has changed at transition from one moment or time period to another.

Characteristics of dynamic sequences relative change are the indicator value growth rates and increase rates.

The growth rate is the relation between two levels of dynamic sequences expressed in coefficients or percent. Like absolute increases, the growth rates can be chain and baseline.

The chain growth rate expressed in coefficients shows by how many times the indicator current level has grown in comparison the preceding one.

The baseline growth rate is calculated in relation to the selected baseline period (more often to a level). Expressed in coefficients, it shows by how many times the indicator value of the current level has changed in comparison with the baseline level.

The average growth rate (average growth coefficient) in dynamic sequences with equidistant levels is computed by formula of simple average geometrical value.

In order to identify by how many percent the indicator current level is more or less than the values of the preceding or the baseline level, the rates of increase are calculated. They are calculated by subtraction from the corresponding growth rates expressed in percent, 100.

Significant seasonal fluctuations in the demand for tourist products are specific for tourist market. By the degree of tourist trips intensity four seasons of tourist activity are identified:

– peak season is the most favorable period for organization of recreational activity, characterized by maximum density of tourists and the most comfortable conditions for recreation;

– high season is the period of the greatest business activity in the tourist market, the period of the highest tariffs for the tourist product and services;

– low season is the period of the tourist activity decreasing in the tourist market, for which the lowest tariffs for the tourist product and services are specific;

– slack season is the maximum unfavorable period for recreation activity organization.

Seasonal prevalence in tourism affects the demand and production, significantly influences profitability of all tourist firms as well as other manufactures directed, toward tourist service operations.

Seasonal prevalence is a steady pattern of annual increases (decreases) in the levels of a particular indicator for a number of years.

Seasonal prevalence is defined by several factors. These factors are subdivided into primary and secondary ones.

To primary factors those factors are referred, which are formed under the influence of natural climatic conditions, the quantity and the quality of benefits for the development of sport, recreation, informative and other types of tourism. Natural & geographical conditions are governing for selection of this or that region for visiting by tourists.

To secondary factors of seasonal fluctuations the following ones are referred:

– economic, i.e., the goods and services consumption structure, creation of the demand solvency through supply;

– demographic, i.e., differentiated demand by age and sex pattern and other attributes;

– psychological, i.e., traditions, fashion, imitation;

– material & technical, i.e., accommodation, catering, transport, cultural & recreation services network development;

– technological, i.e., a complex approach to providing of high-quality services;

– political situation and international environment.

Conclusions. The volume of sold tourist services has an obviously expressed seasonal pattern, which is conditioned by many factors (the season, period of leave, vacation, etc.). Therefore, for analyzing and planning the volume of sold services of a tourist agency it is necessary to take into account the pattern of fluctuations of indicators. For these purposes, statistical study of seasonal fluctuations is carried out.

In the practice of economic analysis various methods of the final estimation of the seasonal prevalence index are used: simple average, analytical leveling, relative numbers, moving mean, etc.

The study of seasonal prevalence phenomenon makes it possible to influence the irregularity of demand in tourism. Currently, a trend towards the decrease of seasonal irregularity in tourism services is observed in the tourism market of developed countries, as the efforts are taken there to develop the supply in priority to the demand.

For instance, sea tourism is developed in France and Italy while mountain tourism is developed in Switzerland and Austria. In a number of regions the adverse effect of seasonal prevalence in tourism is mitigated by flexible pricing ensuring a good demand and appropriate profitability of production.

Other methods are used to resolve the profitability problem along with the price differentiation. Development of non-seasonal forms of recreation and service is one of such methods.

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Кущенко О.І.
Харківський національний університет імені В.Н. Каразіна

МЕТОДОЛОГІЯ АНАЛІЗУ МІЖНАРОДНОГО ТА ВНУТРІШНЬОГО ТУРИЗМУ ЗА ДОПОМОГОЮ УЗАГАЛЬНЕННИХ СТАТИСТИЧНИХ ПОКАЗНИКІВ

Анотація
У статті розкриті основоположні принципи та сутність статистики ринку туристського продукту. Вона розглядає систему основних показників як методологію статистичної оцінки і аналізу туристської діяльності, а також її конкурентоспроможності на різних рівнях. Стаття є продовженням, вже раніш опублікованої роботи, яка була присвячена методологічним основам статистики туризму [1, с. 70-73]. У даному випадку, статистична оцінка охоплює сферу міжнародного та внутрішнього туризму. Показники розвитку міжнародного туризму важливі щодо розробки стратегії і тактики діяльності на ринку туристського продукту країни. Грамотно підібрані щодо аналізу статистичні методи завжди є заставою успішної роботи з інформацією. Усі представлені показники є фундаментом інформаційної бази, необхідної щодо прийняття управлінських рішень у сфері туристської індустрії.
Ключові слова: варіаційний аналіз, індексний аналіз, ряди динаміки, сезонні коливання у туризмі.

Кущенко Е.И.
Харьковский национальный университет имени В.Н. Каразина

МЕТОДОЛОГИЯ АНАЛИЗА МЕЖДУНАРОДНОГО И ВНУТРЕННЕГО ТУРИЗМА С ПОМОЩЬЮ ОБОБЩАЮЩИХ СТАТИСТИЧЕСКИХ ПОКАЗАТЕЛЕЙ

Аннотация
В статье раскрыты основополагающие принципы и сущность статистики рынка туристского продукта. Она рассматривает систему основных показателей как методологию статистической оценки и анализа туристской деятельности, а также ее конкурентоспособности на различных уровнях. Статья является продолжением, уже ранее опубликованной работы, посвященной методологическим основам статистики туризма [1, с. 70-73]. В данном случае, статистическая оценка охватывает сферу международного и внутреннего туризма. Показатели развития международного туризма важны для выработки стратегии и тактики деятельности на рынке туристского продукта страны. Грамотно подобранные для анализа статистические методы всегда являются залогом успешной работы с информацией. Все представленные показатели являются фундаментом информационной базы, необходимой для принятия управленческих решений в сфере туристской индустрии.
Ключевые слова: вариационный анализ, индексный анализ, ряды динамики, сезонные колебания в туризме.