Models for forecasting systemic transformations in the economy of resort-recreational sphere

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Abstract. The development of the economy of the recreation, resort and tourism sphere is an important component of the development of the world economy. Resorts are one of the most highly profitable areas of management. Ukraine has a powerful resort and tourism potential, the effective development of which can bring real economic benefits. It is necessary to carry out systemic transformations for the development of such systems, an integral part of which is the formation of cost and economic systemic effects. The author's concept based on the theory of indicators is used as a methodological approach. The proposed concept is used to analyze and predict economic processes in the resort and recreation sector. In the study was built a set of forecasting models, which allows with a high level of reliability to analyze structural changes in the resort-recreational economy and build new development strategies. Forecast calculations are made and scenarios of the development of the resort and recreation sphere are obtained. The simulation results can be used to formulate a new, modern strategy for the development of resorts and tourism in Ukraine.

Keywords: resort-recreational economy, systemic transformations, forecasting models, structural shifts, set of indicators.

1 Introduction

In today's world economy, recreation and tourism industries are one of the most profitable and dynamically growing spheres. For many countries, this is not only a constantly increasing source of financial revenue, but also a source of infrastructure development and additional jobs through the attraction of millions of tourists. Ukraine has a powerful resort and touristic-recreational potential, and the effective use of it can bring real economic benefits. Therefore, in the process of market transformation of the economy, the recreation and tourism spheres should occupy one of the leading positions in the structure of the economic complex.

One of the main concepts of the development of touristic-recreational industry, the importance of which is especially growing in the process of economic transformation, is to enhance the level of cooperation and mutual support of resort, recreational and tourist businesses which operate within the resort and recreation complex. There is a need to formulate development strategies based on obtaining additional effect of transformational policy to be implemented. Identification and use of such effects

helps to identify rational motives for the transformation of the resort and recreation complex, combining the directions of activity of individual resort and tourist organizations, as well as other forms of expansion of the resort and recreational spheres.

2   Related work

Significant scientific contribution to the formation of a theory of structural transformation of the economy and structural crises and their impact on the prices was made by representatives of different schools of economic thought. The theoretical findings of J. Schumpeter, P. Samuelson, J. Van Dain, D. Freeman, J. Forrester, M. Porat, and R. Reich have become the starting points for further research in the field of structural shifts, contributing to a deeper understanding of economic transformations, in particular, in the resort and recreational industries. However, the problems of forming a structural contour during the transformation of the national economy remain debatable.

Despite the considerable number of researches devoted to the economy of resort and recreational systems, the idea of mechanisms of economic transformations and cost effects are abstract in nature and are not systematic. There are virtually no studies based on model application and computer analytics. The current situation necessitated the creation of modern modelling techniques for further research and practical application in connection with the undeniable significance of the problem of transformational development of the resort and recreational economy.

3   Research objectives

The formation and development of market relations in the resort and recreational spheres is accompanied by active transformation of prices for resort products and services. This is reflected both in significant inflation rates, that is reflected in changes in the scale of prices, as well as in intense and uneven shifts in their structure, which is understood as a combination of proportions of prices for various resort and recreational products. Price shifts are always associated with economic transformations occurring in the resort and recreation complex [1, 2].

The purpose of the study is to analyze and predict the price shifts in the resort and recreational economy during the transition to a new development strategy, which involves the predominant provision of resort and recreational services integrated with the leisure and tourism industries.

4   Methods and results of research

Price is the most important element in the structure of economic relations in which the interests of the state, business and the general public are focused. The analysis of the current price situation reveals the existing or emerging contradictions between the interests of the different stakeholders in the economy, to determine the causes of dis-

tortions or price disparities, to draw conclusions about the trajectory of further pricing process. Thus, the study of the price situation on the market makes significant contribution to the analysis of the transformational economy. Firstly, it makes the analysis systematic, and secondly, determines the price criteria for the stable state business entities and consumers [3].

Transformation processes in the economy are usually fleeting compared to sustainable economic development. Therefore, many economic processes, that take place in a national transformation economy, are characterized by significantly less typical times than those in the relatively stable economies of other countries. In this regard, in the economy of resort and recreational systems systemic effects in the form of cost transformation effects are revealed. These effects include the intense and progressive structural changes in the price system that have taken place over the years under the old resort and recreation strategy and the new economic development strategy. These shifts are an important part of the transformation processes in the national resort and recreation economy and are not pertain to sustainable economies. They are caused, on the one hand, by significant price disparities and, on the other hand, by the stability of current price proportions, which tend to reproduce at a new level of prices, making the process of their change lasting. This situation in the change of price proportions is a fundamental factor in the dynamics of domestic prices for resort and recreational products [4].

It should be noted that the change of proportions between the elements of the same totality over time indicates a change in its structure, that is, structural changes. Structural shifts are a consequence of differences in the growth rate of elements of the totality. An easy way to analyze the size of structural shifts is to compare individual or group shares. However, they do not give a comprehensive description of the structural shifts of the compared totalities. For this purpose, a considerable number of different consolidated indicators of structural cost shifts have been proposed [5].

There are two main approaches to the construction of structural shift indicators in the economic literature. Both approaches involve the use of data for some set of resort and recreational products. According to the first approach, for each pair of mapping situations, we consider a set of individual price indices for a set of resort and recreational products. Indicators are constructed by analogy with estimates of numerical characteristics of one-dimensional probability distributions. The Structural Shift Indicator is seen as a measure of the dispersion of the distribution of individual indices, as a supplement to the consolidated price index. This approach develops the ideas of stochastic index theory [6].

According to the second approach, for each of the mapping situations, we construct n-dimensional vector based on a set of n resort and recreational products, the components of which form a co-dimensional set. For each pair of situations, a pair of vectors in n-dimensional space are compared, differing in both length and direction. The ratio of the norms of these vectors can be considered as a summary price index, and the function of distance between their directions as an indicator of structural shifts. The vector approach is based on the axiomatic theory of indexes [7].

Both approaches have many things in common, as they both view structure as a set of proportions between elements. In both cases, the movement of the resort and recre-

ation system is described by consolidated price indices, the relative movement of prices within the system is described by indicators of structural shifts.

The advantage of the first approach is the possibility of using functions of selective moments in it, whereas in the second approach only the relation between the norms of two vectors and the distance between their directions are naturally interpreted. The advantage of the second approach is the ability to analyze the entire trajectory of the movement of the price vector, in particular, more convenient to analyze the progressiveness of structural shifts.

Based on the second approach, let's build a set of indicators that allow us to analyze structural cost shifts in the resort and recreational economy. Let $p_{jt} > 0$ – domestic prices of the resort and recreational product j of the period t; $j = \overline{1, n}$, n – the quantity of resort and recreational products in the set; $q_j > 0$ – volumes of products produced. The set $u_{jt} = q_j p_{jt}$, $j = \overline{1, n}$ – for each period t is commensurate, and $u_{jt} > 0$. We denote it v_t and call it a vector of prices for the period t. We define the distance between the directions of two vectors x and y in the space of vectors of prices for the chosen norm as $m(x, y) = \frac{1}{2} \left\| \frac{x}{\|x\|} - \frac{y}{\|y\|} \right\|$.

We will use the following indicators. The ratio of norms of vectors of prices $i_t = \frac{\|v_t\|}{\|v_{t-1}\|}$ and $I_{t_1, t_2} = \frac{\|v_{t_2}\|}{\|v_{t_1}\|}$ give the estimates of inflation (price increases) over time from $t - 1$ to t and from t_1 to t_2, respectively, that is, aggregate price indices. The distances between the directions of the vectors of prices for the two periods $d_t = m(v_{t-1}, v_t)$ and $D_{t_1, t_2} = m(v_{t_1}, v_{t_2})$ allow us to estimate the structural shifts from time $t - 1$ to t and from t_1 to t_2 respectively, so they can be used as chain and base indices of structural shifts.

If $p_{jt} > 0$ – the external prices of the period t, the vector of their prices v_t has components $u_{jt} = q_j p_{jt}$, $j = \overline{1, n}$, then the indicator $I'_t = \frac{|v_t|}{|v'_t|}$ gives an estimate of the private purchasing power parity for the used set of resort and recreational products. The indicator $D'_t = m(v_t, v'_t)$ allows to evaluate the structural changes between the internal and external prices of the period t, so it can be used as an index of quality of structural changes. Thus, we get three indicators: $\left(i_1, I_{t_1, t_2}, I'_t \right)$, $\left(d_t, D_{t_1, t_2}, D'_t \right)$.

Let's consider the effect of transformation of prices in the conditions of the old and new strategies of development of the resort and recreational industries. As shown earlier, the new strategy for the development of the resort and recreation sector provides for the providing of resort and recreational products integrated with the leisure and tourism industries. Based on the data presented in the sources [8, 9, 10], we will construct indices for the resort and recreational economy and analyze them. The main tasks of the analysis of effect of transformation of prices can be reduced to the following groups.

The task of analyzing the intensity of structural shifts in the price system allows us to determine in which of the successive time intervals the structure of the tourism and recreational system has undergone a significant change, and in which - less. To do this, we will use an indicator d_t called the structural shift intensity index. Its essence is that the faster structural changes occur, the higher is d_t. Values d_t shows how

quickly changing of the price ratios occurs. It should be noted that this indicator does not tells us the direction of structural shifts, but only determines their speed. However, these indicators are the most commonly used in practice. The dynamics of the indices of the structural changes d_t in the conditions of the old and new strategies of development of the resort and recreational spheres are shown in Fig. 1 and Fig. 2.
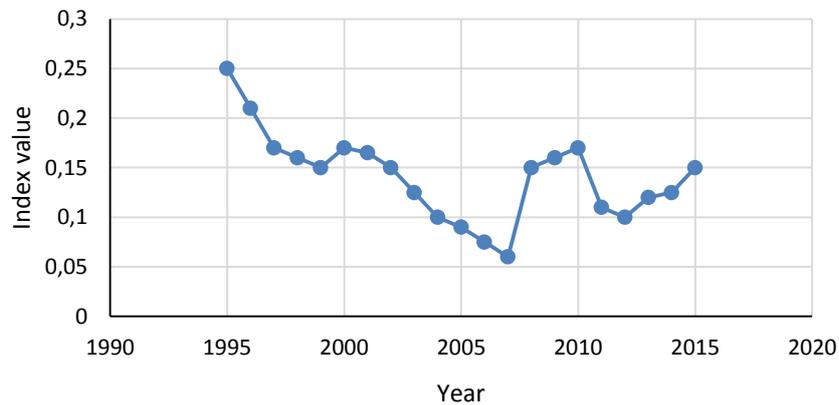
Fig. 1. Dynamic of the index of intensity of structural shifts in the price system under the old strategy of functioning

As can be seen from Fig. 1 the intensity of structural changes in the price system in the operation of the resort and recreational industry under the conditions of the old strategy is controversial. The periods of decline in the intensity of shifts were changed by the periods of their growth. This is indicative of the unstable nature of the resort and recreation economy, which operates in the conditions of chaotic changes in the scale of prices and price disparities. All the same variants of the index for the new strategy of development of the resort and recreational sphere (Fig. 2) show a downward trend.
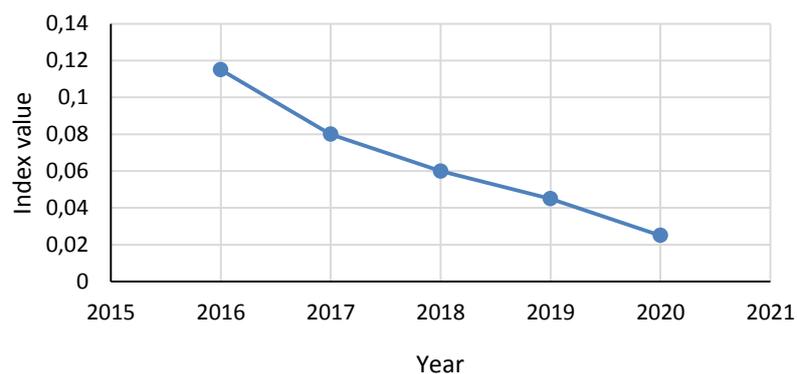

Fig. 2. Dynamic of the index of intensity of structural shifts in the price system under the new strategy of functioning

The decline of d_t over time means an increase in the synchronization of changes in prices for resort and recreational products. As we move from the market with direct regulation of prices to market relations, where prices are set on the basis of market mechanisms and inflation decreases, such dynamics of d_t testify to the high efficiency of activity of the resort and recreational industries. Thus, this is how systemic transformation effect on price in the resort and recreation economy is manifested.

It should be noted that the indicator d_t does not allow to judge whether the intensity of structural shifts reflects the progressiveness of transformation processes or the consequence of irregular fluctuations in individual price indices, since the values of the indicator reflect both the overall shift in price structure and the asynchronous change in prices for individual resort and recreational products.

The goal of analyzing the progressiveness of structural shifts in the price system is to determine to what extent structural shifts is explained by a tendency, and to what extent they are merely the result of irregular fluctuations. This task answers the question of whether the structure of the resort and recreation system has changed. The indicator D_{t_1,t_2}, called the basic structural shift index, quantifies the structural shift over the time that has elapsed between periods t_1 and t_2. This indicator shows how much price ratios for the period t_2 have changed compared to the price ratios of the period t_1. The higher the value of the index, the more the price structure changed, and vice versa. So this makes it possible to use D_{t_1,t_2} as the indicator of progressiveness of structural changes in the resort and recreational spheres. The index does not show the direction of structural shifts, but only determines their scale. The dynamics of the structural indices of structural changes D_{t_1,t_2} in the conditions of the old and new strategies of development of the resort and recreational industries are shown in Fig. 3 and Fig. 4.
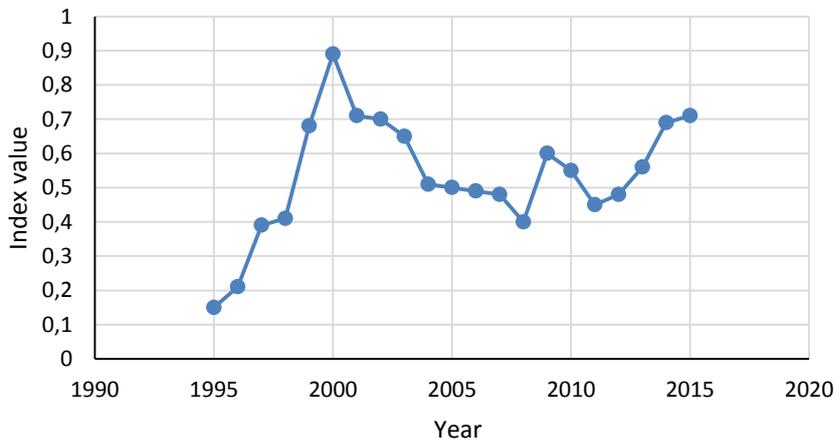
Fig. 3. Dynamic of the index of the progressiveness of structural shifts under the old strategy of functioning

The results of the calculations presented in Fig. 3, show that there was a significant change in the scale of prices and significant shifts in price proportions at this period of time. This is due to the introduction of market relationships in the resort and recreation industries, the growth of inflation and the economic transformations that are taking place in the resort and recreation economy. In case of transition to the new strategy of development in Fig. 4 shifts in price proportions tend to decline, indicating a stabilization of price proportions. Thus, we can speak of the existence of the effect of transformation of prices, which is the phenomenon of powerful translational structural shifts not only in the short, but also in the long term.
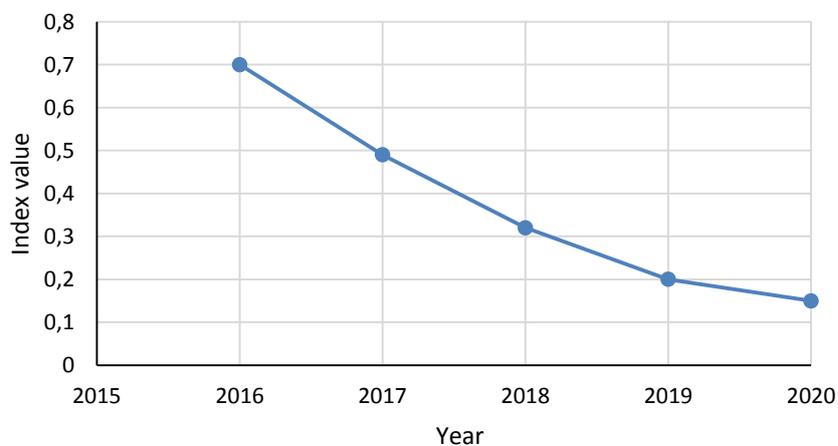
Fig. 4. Dynamic of the index of the progressiveness of structural shifts under the new strategy of functioning

The analysis of the intensity of structural changes, even supported by the analysis of their progressivity, does not allow to draw conclusions about their orientation in the resort and recreational spheres. Thus, it is almost impossible to judge whether the structure of the resort and recreation system has improved, whether it has deteriorated or remained unchanged as a result of changing and implementing new development strategies. The solution of the problem of directionality of structural shifts of the price system allows to obtain an assessment of the quality of the structure at each investigated moment of time, i.e. to evaluate both the scale of quality and its dynamics.

We use an indicator D'_t, called the structural shifts quality index, to analyze the orientation of structural shifts in the price system in the national resort and recreation industries. In this case, it shows how big the difference is between the internal price structure of period t and the fixed external price structure. The smaller D'_t, the closer the internal and external structures are. The zero value of the indicator corresponds to the full coincidence of price proportions. The dynamics of quality indices D'_t for resort and recreational products are shown in Figure 5.
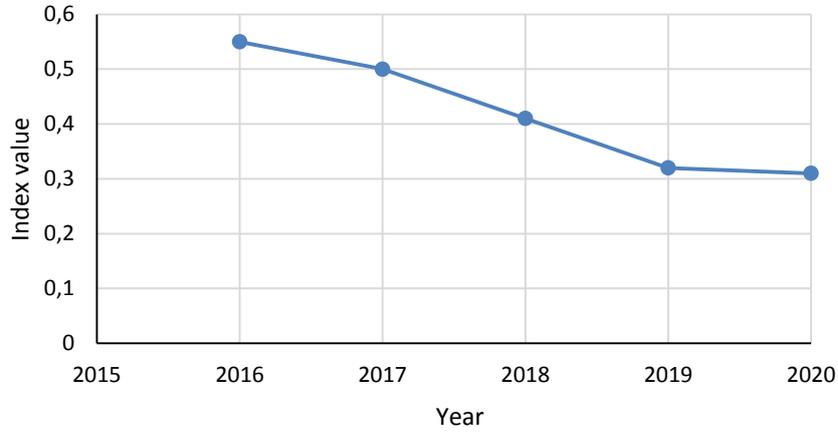
Fig. 5. Dynamic of the index of quality of structural shifts in the resort and recreation industries

It is noticeable that is the large value of the index at the beginning of this period. This means that the structure of national consumer prices and European prices is significantly different. In general, the nature of the transformation process demonstrates a downward trend over time. This leads to the conclusion that as the transformation process progresses, the price structure will converge, while remaining below European prices [11]. Such a scenario is one of the competitive advantages of the national resort and recreation sector. Thus, the practical calculations confirm the hypothesis that as the market relations in Ukraine develop, the degree of openness of the national economy and the elimination of imbalances, the structure of domestic prices for resort and recreational products should gradually approach the price proportions characteristic of the world economy.

Based on the results of the analysis of indicators D_{t_1,t_2} and D'_t, it can be concluded that the structure of national consumer prices for resort and recreational products as a whole demonstrates a tendency to move away from its initial state and move closer to the structure of European consumer prices.

In economic literature, a significant amount of various summary indicators of structural shifts is offered. For our research we will use the following indicators:

— chain index of production volumes $i_t = \frac{\|v_t\|}{\|v_{t-1}\|}$, which shows the ratio of the lengths of the vectors and gives a summary estimate of the change in the production of resort-recreation products over time from $t - 1$ to t;

— chain index of structural shifts $d_t = \left\| \frac{v_t}{\|v_t\|} - \frac{v_{t-1}}{\|v_{t-1}\|} \right\|$, which shows the distance between the directions of the cost vectors for the current period and the previous one, and allows us to judge the structural changes. A chain index of structural shifts, based on the comparison of adjacent periods, giving a quantitative assessment of structural shifts at a single step in time, allows to solve the problem of analyzing the intensity of structural shifts in the resort-recreation economy. That is, to

determine in which of the successive intervals the structure of the population has undergone a more significant transformation, and in which – less. Than bigger d_t, the more intensively there are structural shifts and vice versa;

— basic index of structural shifts $D_{t_1,t_2} = \left\| \frac{v_{t_2}}{\|v_{t_2}\|} - \frac{v_{t_1}}{\|v_{t_1}\|} \right\|$, which shows distance between the directions of vectors of costs for two any periods and allows to judge about the structural shifts, which happened for appropriate time.

Thus, summary indicators of structural shifts d_t and D_{t_1,t_2} can be also presented and as distances between the directions of vectors of costs during the comparable periods and as relative measures of a variation of individual indexes of the production of resort-recreation products. The basic index of structural shifts based on comparison of any periods, giving a quantitative assessment of structural shifts for corresponding time, allows to solve a problem of the analysis of gradualness of structural shifts. That is, to determine to what extent structural shifts are based on a tendency, and to what extent they are only a result of irregular fluctuations. The more D_{t_1,t_2}, the more the structure of production changed, and vice versa. At the same time, it should be noted that indexes of structural shifts d_t and D_{t_1,t_2}, allowing to analyze intensity and progressiveness of such shifts, do not allow to solve a problem of the analysis of orientation of structural shifts. That is, they do not allow to determine whether the structure of the recreation-recreation system has improved, whether it has deteriorated or remained unchanged.

For the purpose of the solution of the specified problem, we will use the indicator of quality of structural shifts in resort-recreation economy. We will define the index of quality of structure in a look $G_t = \frac{\sum_j a_j q_{jt} p_j}{\sum_j q_{jt} p_j}$. The value G_t shows flowing quality of structure of production of a resort-recreation product according to the entered criterion. Growth G_t over time and as a result of transformations corresponds to an improvement in the quality of the structure, a decrease – a deterioration.

Based on the data provided in sources [9, 10] we will construct the specified indexes for resort-recreation economy and we will carry out their analysis. The dynamics of the national resort-recreation economy of the period ($T_1 = 2000 - T_2 = 2020$) in question has a clear character of the transition process. Initially, there was a tendency of a slow recession with periods of small growth, and then there was a tendency to accelerate the recession with the transformation into a transformational crisis (Fig. 6). At the lower point of the recession (2014) the intensity of production of the resort-recreation product is only 37% of the level of 2000, that is the resort activity decreased by 2.6. Such scale transformational crisis is caused by a number of the reasons. One of the system-wide reasons is that than the system is more difficult, especially it will undergo deep crisis at transformations.
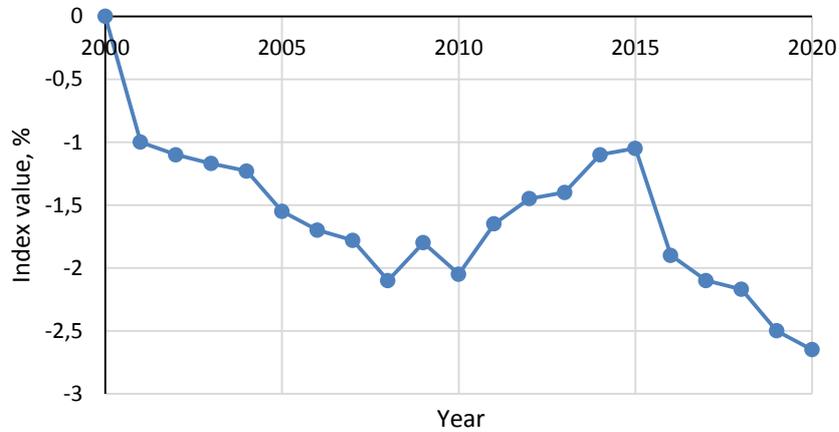
Fig. 6. The chain index of volumes in general on the resort-recreation sphere and its trend for the period $T_1 = 2000 - T_2 = 2020$ years

The great depth of the transformation crisis in the resort-recreation economy reflects the great complexity of the pre-national complex. The higher the level of development of such systems, the earlier the deeper the transformational crisis in them. This is one of the differences of economic transformation in Ukraine from other countries. Another reason for this is that there are significant disparities in the national economy, when the resort-recreation sector has not been given due attention. At the same time, in developed market economies, resorts and tourism are among the main budget-forming industries. Another cause of the crisis is the sharp decline in demand for national resort-recreation products. It is caused by low consumer solvency, quality of services provided, low competitiveness of Ukrainian health resorts and unpromising development strategy.

Against the background of the general trend of the transformation crisis, small cycles of the dynamics of production of resort-recreation products are observed. Thanks to these cycles, the crisis develops rather unevenly, with shocks (Fig. 6), periods of its sharp acceleration, alternating periods of short-term stabilization and recovery. Such cycles are not typical of sustainable economies. Therefore, the national resort-recreation economy can be characterized as a fast-changing economy, and this significantly differentiates it from existing stable economies. Thus, there is another strategic systemic effect.

The way out of this situation is the transition to a new strategy for the development of the resort-recreation sector, which involves the predominant provision of resort-recreation services integrated with the leisure and tourism industries. Such a transition is always accompanied by economic transformations associated with the transformation of the existing structure of the resort-recreation systems, and structural changes in the economy. In Fig. 7 shows a chart of the chain index of structural shifts in the production of resort-recreation products d_t, which shows how quickly structural changes occur in this case. From the graphics it follows that the intensification of

changes in the volume of production of resort-recreation products in the transition to a new strategy for the development of resort-recreation sphere is accompanied by intensification of changes in the structure of systems. Such dynamics confirms the hypothesis that there is an effect of linking the intensity of structural shifts with the rate of change in the volume of production of resort-recreation products.
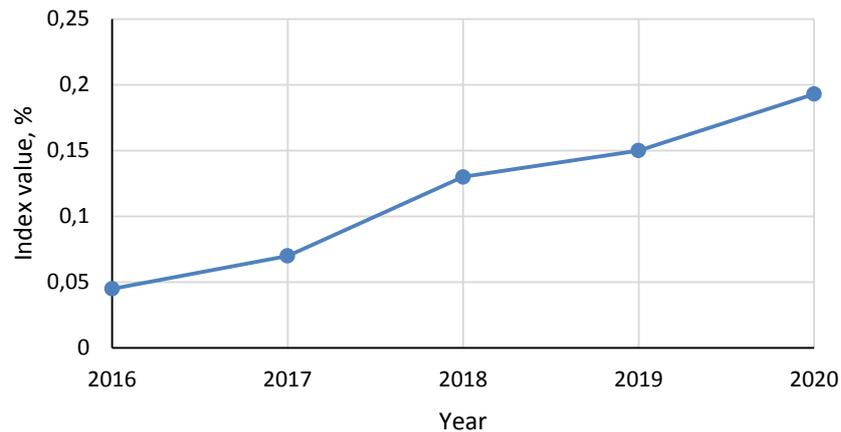
**Fig. 7.** Index of intensity of structural shifts d_t

As the indicator of forward structural shifts, we will use the basic index of structural shifts D_{t_1,t_2}. Calculation results, which are presented in fig. 8 shows that in case of transition to the new development strategy for the analyzed period in the resort-recreation sphere there will be considerable shifts in structure of production of resort-recreation products.
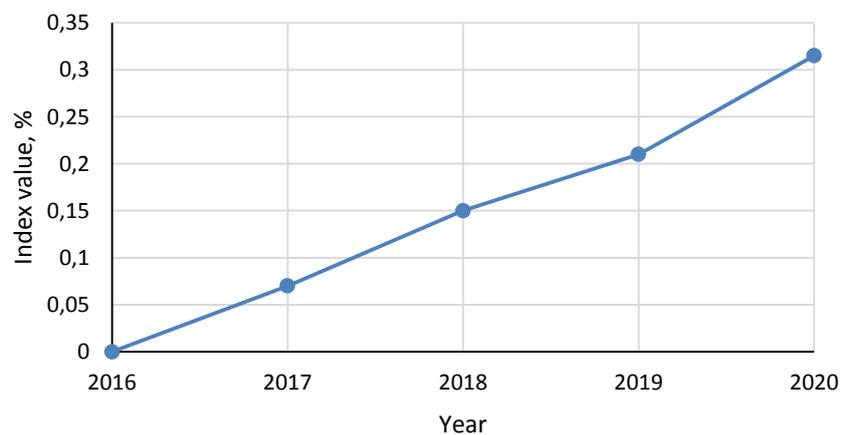
Fig. 8. Basic index of structural shifts D_{t_1,t_2}

In particular, the tendency to withdrawal of proportions of production from proportions, existing prior to economic transformations is observed. Value D_{t_1,t_2} shows the considerable scale of such removal for all analyzed period. That circumstance that D_{t_1,t_2} grows with growth $|t_2 - t_1|$ indicates existence of forward structural shifts on all considered time interval.

For the analysis of orientation of structural shifts, we will make calculations and we will construct the schedule of the index of quality of structure of production of resort-recreation products G_t (fig. 9). Dynamics G_t shows steady growth throughout the analyzed period. Therefore, upon transition to the new development strategy, the quality of structure of a system improves, and production of innovative resort-recreation products grows at the advancing rates.
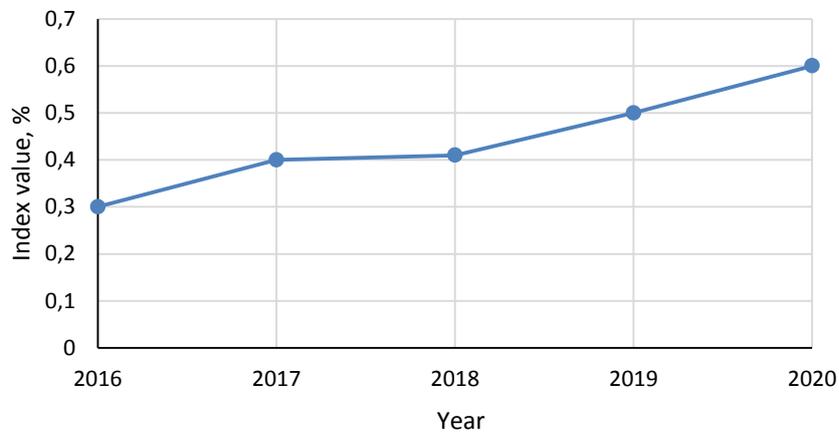
Fig. 9. Index of quality of structural shifts G_t

Thus, the index of quality validates the choice of the direction of carrying out transformations. That is transformational process in the resort-recreation sphere has to be followed by structural shifts of such orientation and can be considered as one more strategic system effect.

5   Conclusions

Summarizing the results of the conducted research, it should be noted that the model of functioning of the resort and recreation industries, which was based on the old strategy of development, was accompanied not only by a considerable inflation rate, but also by an intensive transformation of price proportions. The period of such shifts proved to be very stretched over time. Not only intensive structural shifts in the short term, but also translational shifts in the long term are observed.

One of the price transformational effects of this period was the practical absence of movement of consumer price proportions during their liberalization in the direction of

eliminating existing imbalances. They were only partially eliminated with rising prices and after a long time. This is explained by the stability of price proportions, which tend to reproduce at each new price level, and reflects the integrity of the national resort and recreation sector. Thus, there is a situation of combining the stability of price proportions with the large scale of their change, which is characteristic of a transformational economy.

In the context of the new development strategy of the resort and recreation industries, there is a positive correlation between the inflation rate and the intensity of structural shifts: higher inflation rates are generally accompanied by more intense structural shifts, and vice versa. This effect is observed both in the short and long term. Thus, the existence of a long-term effect of the link between the accumulated structural shifts and the total increase in prices can be considered a specificity of the national resort and recreational economy.

References

1. Barro R. J.: Economic Growth in a Cross Section of Countries. The Quarterly Journal of Economics 106(2), 407–443 (2016).
2. Brownrigg M.: Differential multipliers for tourism. Scottish Journal of Political Economy 1(3), 29–37 (2017).
3. Campbell A. Strategic synergy. An International Thomson Publishing Company, Washington (2018).
4. Humeniuk V.: Financial nature of resort multiplier. Financial and credit activity: problems of theory and practice 2(25), 417–423 (2018).
5. Ravenscroft N. Recreation Planning & Development. McMillan, New York (2019).
6. Glejser H.: Inflation, Productivity, and Relative Prices – A Statistical Study. The Review of Economics and Statistics 47, 66–80 (2015).
7. William A. Recreation and the Local Economy an Input–Output Model of a Recreation-Oriented Economy. Graduate School of Business University of Wisconsin–Madison (2017).
8. Materials of the State Statistics Service of Ukraine, http://www.ukrstat.gov.ua, last accessed 2020/03/15.
9. Materials of the main statistics department in the Zaporizhye region, http://www.zp.ukrstat.gov.ua, last accessed 2020/03/12.
10. UNWTO Statistics, http://www.unwto.org/index.php, last accessed 2020/03/19.
11. Materials of the World Economic Forum, http://www.weforum.org/en/index.htm, last accessed 2020/03/19.