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Methodical approaches and statistical analysis of tourist arrivals to the centers of sightseeing tourism (on the example of Chernivtsi, Ukraine)

Abstract: The aim of the study is to define methodological approaches and methods of statistical analysis of arrivals to the centers of excursion tourism. In destinations with highly appealing attractions or objects, accurately accounting for the number of tourists visiting them is crucial. In Chernivtsi, such an attraction or object is the former Residence of the Bukovinian Metropolitans, a UNESCO monument. The statistical analysis traces the dynamics of the number of excursion visitors to the former Residence. It identifies the factors that influenced it, including the inclusion of the site in the UNESCO list, Russian aggression since 2014, and the COVID-19 pandemic. Based on the statistical reporting data analysis of the Historical and Architectural Museum Complex of Chernivtsi National University, three periods of excursion activity from 2000–2021 were identified. The first period (2000–2017) is characterized by rapid growth due to the inclusion of the former Residence in UNESCO. The second period (2017–2019) is a period of stagnation of excursion activity with minor fluctuations. The hypothesis and data analysis confirmed the thesis that the occupation of Crimea by Russia had an impact on the redistribution of tourist flows, particularly during the May holidays, within Ukraine, specifically in Chernivtsi. The third period (2019–2020), characterized by a sharp decline followed by the same dynamic growth (2020–2021), was caused by a force majeure event of global proportions – the COVID-19 pandemic.

Keywords: methodology of tourism flow accounting; sightseeing tours and excursions; sightseeing visits; tourism and UNESCO sites

Introduction

In many countries of the modern world, the tourism industry occupies one of the leading positions, significantly contributing to their economy and promoting the socio-economic development and living standards of each tourist-attractive region. One of the principal

types of tourism is considered to be sightseeing or cultural tourism. Objects recognized and included in the UNESCO World Heritage List hold particular significance for tourists. Their presence in a certain territory significantly increases the interest of both foreign and domestic tourists not only in the landmark itself but also in the destination as a whole.

Chernivtsi is renowned as one of the prime hubs for sightseeing tourism in Ukraine. Tourists are attracted to the city's historic center, which was formed during its inclusion in the Austro-Hungarian Empire. The inclusion of the Chernivtsi National University (formerly the Residence of Bukovinian and Dalmatian Metropolitans) in the UNESCO World Heritage List on June 28, 2011, significantly heightened the appeal of this destination among tourists. This example shows how inscribing a site on the World Heritage List can influence the dynamics of tourist arrivals. It is also scientifically intriguing to analyze the effects of both global factors, such as the COVID-19 pandemic, and regional factors, like the annexation of Crimea by Russia in 2014, on the dynamics of tourist arrivals to sightseeing tourism centers such as Chernivtsi.

ANALYSIS OF RECENT STUDIES AND PUBLICATIONS

The first step in the study of any phenomenon or process is a review of the most recent publications in the relevant field of science. In our particular research, which involved a statistical analysis of tourist arrivals and monitoring tourist activities in the UNESCO area, our primary focus was on scientific articles that investigated the connection between the UNESCO status and tourist arrivals, as well as the potential impact of this association.

In the article by D.J. Timothy (2017), current trends in the field of sightseeing tourism were examined. The focus was primarily on the increasing use of scientific methodologies to study cultural heritage and expanding opportunities for consuming tourist products. On the other hand, R. Patuelli, M. Mussoni, and G. Candela (2013) conducted research on the role of cognitive tourism in broadening the customer base and diversifying the offerings available to tourists.

In their study, G. Ribaudo and P. Figini (2017) explored various aspects related to the World Heritage Site (WHS) status. They examined the role of WHS status in promoting and managing the location, as well as its social and economic impact on the UNESCO site. Additionally, they analyzed visitors' perceptions and attitudes towards the site. However, the main focus of their research was on investigating the impact of WHS status on tourist arrivals. This particular aspect will be the central focus of our study as well.

It should be noted that most publications can be organized around specific themes, which sometimes exhibit distinct polarity. these themes represent a span from the positive impact of the UNESCO status to the negative consequences associated with it, overall satisfaction of both residents and tourists to conflicts between them, successful policies of national and local authorities to the total lack of support offered by them and failed management of historic sites, estimating of economic benefits in WHS protected locations to foreseeing the damages caused to the sites and nearby areas. The diverse range of topics and viewpoints within these publications shows the complexity and multidimensional nature of research in this field.

According to Ch.-E. Ong (2010), Z. Alrawadieh, G. Prayag & M. Alsalameen (2019), there is a positive relationship between UNESCO heritage sites, destination involvement, overall satisfaction and destination loyalty. J. Hernández-Ramírez (2019) also emphasizes the economic benefits of increased tourist arrivals to WHS locations. Yu-W. Su, H.-L. Lin

(2014), R. Buckley (2004), C.-H. Huang, J.-R. Tsaur, C.-H. Yang (2012); Ya. Gao, M. Fang, Yo. Nan & W. Su (2022); V. Ivanunik, H. Krul and S. Bryk (2021) focus on the close correlation between World Heritage sites and international tourist arrivals. Research by A. Ung & L.T.-N. Vong (2010, 2012) highlights the increasing of the historical attractiveness of the location following its inscription on the World Heritage List and aims to develop tourism plans for effective promotion of the site.

The negative assessment of the destination after its inscription in UNESCO, the complex relationship between tourism and monument conservation, and the questionable economic effect are discussed in the studies by M.M. Mariani & A. Guizzardi (2020), R. Cellini (2011), C. Zhang, A. Fyall, Y. Zheng (2015), A. Al-Tokhais & B. Thapa (2020).

A separate group includes research aimed at determining the role of the UNESCO List in increasing the competitiveness of tourist destinations in economically developed countries (Cuccia, Guccio, Rizzo, 2016; Patuelli, Mussoni & Candela, 2013) and developing countries (Hosseini, Stefaniec, Hosseini, 2021; Ryan & Silvanto, 2011; Srijuntrapun, Fisher & Rennie, 2018, etc.). The consequences of the inclusion of a cultural site in the WHS are discussed in the article by T. Cuccia (2012), which emphasizes the positive impact of the WHS inscription on tourist flows and some of the difficulties caused by it. In addition to the positive impact of World Heritage sites on increasing tourism demand in developing countries (Hosseini, Stefaniec, Hosseini, 2021), there has also been an increase in social and environmental problems associated with them. In developing countries, attention has been drawn to the neglect of protected areas, and ways of their sustainable conservation have been proposed. This issue is also explored in the publication by Daniel H. Olsen (2010), which delves into the same topic. Using the method of predictive assessment, L.Y.Y. Moy & S. Phongpanichanan (2014) found a close relationship between the ever-growing tourist flows and the inscription of sites on the World Heritage List.

Using regression analysis, B. VanBlarcom and C. Kayahan (2011) confirmed the hypothesis that the inscription of the monument on the UNESCO list has the effect of increasing economic benefits. Similarly, P. Srijuntrapun, D. Fisher and H.G. Rennie (2018) observed that tourism-associated livelihoods depend on the WHS, and losing this status may have negative economic aftereffects, especially for developing regions.

Studies that focus on visitors to UNESCO sites, examining their behavior, motives, and challenges, can be regarded as a separate group. B.A. Adie and C.M. Hall (2017) delve into the typology of consumers in this context. C. Lupu, S.S. Padhi, R.K. Pati and O.M. Stoleriu (2021) prove that the fact of including a peripheral monument in the World Heritage List has a decisive influence on the tourist's choice of a particular location.

The study of the impact of social and economic crises on the tourism sector is devoted to the publication of D.L. Senbeto & A.H.Y. Hon (2020).

When it comes to the choice of the study region, studies vary considerably: From comparing the impact of UNESCO status on tourism development on an international scale (Su & Lin, 2014; Ivanunik, Krul, & Bryk, 2021) to studying countries with multiple World Heritage sites (Buckley 2004; Patuelli, Mussoni, & Candela 2013; Cellini, 2011; Cuccia, 2012; Cuccia, Guccio, & Rizzo, 2016) or within a single destination (Ribaudo & Figini, 2017), which is the closest to our study. For example, a municipality has been used as a case study to conduct a thorough investigation of the impact of the Air Force on a destination over a 5-year period before and after the object was declared a World Heritage Site (Ribaudo & Figini, 2017). Furthermore, J. Romão, J. Guerreiro & P. Rodrigues (2013) devoted their study to the consideration of regional tourism.

The methodology, approaches, and results of studies of the impact of a UNESCO site on tourist arrivals also vary considerably. Based on available tourism data, some researchers have estimated the growth in the number of international visitors to destinations (Huang, Tsaur & Yang, 2012; Su & Lin, 2014, etc.), while others have used data on domestic arrivals (Patuelli, Mussoni & Candela, 2013). Some researchers have used the number of overnight stays in local hotels as an indicator of tourism performance (Cuccia, Guccio, Rizzo, 2013; Hernández-Ramírez, 2019) or the ratio of overnight stays to the number of residents (Cellini, 2011).

The issue of overcrowding at historically significant tourist sites and the measurement of their capacity is addressed in the studies conducted by G. Liberatore, P. Biagioni, C. Ciappei, and C. Francini (2022). The article by Guo, Yo., Zhang, J., Yang, Ya., and Zhang, H. (2015) presented the results of a study on models of fluctuations and dynamics of inbound tourist flows. Their research aimed to gain insights into the natural laws and transformations that govern the fluctuations of tourist flows. In another study, Wu, B., Wu, J., Shi, X, Zhang, T., Deng, Ch., and Wu, Sh. (2019) proposed a novel method for forecasting tourist volume in the absence of previous arrival data. Their approach involved utilizing a visitation probability model to make accurate predictions.

As we can see, some of the current publications on the impact of UNESCO's heritage on tourism development in a particular region and the methodology for studying it are concerned with the above issues and problems. Our goal was to trace the dynamics of tourist flows at World Heritage sites and identify the factors that influenced changes in tourist activity.

Study objectives

This scientific research aims to establish methodological approaches to the statistical analysis of tourist arrivals in cultural tourism centers (using the example of Chernivtsi, Ukraine); to trace the dynamics of excursion activity during the period of 2000–2021 and identify the factors that influenced it, including inclusion in the UNESCO World Heritage list, the Russian aggression in 2014, and COVID-19.

Training materials and methodological basis

The methodology of statistical calculation of the number of tourists visiting a particular destination is based on the following approaches: counting arrivals at the border; counting tourists in accommodation facilities; special statistical surveys. Calculating visitor arrivals at the border is unsuitable for studying internal tourism flows, as they do not cross national borders. Moreover, this method is not applicable even in international tourism, particularly in the European Union, where state borders may be so transparent that tourists may not notice their crossing.

The method of tracking tourists in accommodation facilities is not without its drawbacks, but it is suitable for both domestic and international tourism. However, its main disadvantage is that it does not account for day visitors, including excursionists who do not stay overnight. Therefore, it is not very suitable for centers of sightseeing tourism but only plays a supportive role.

Therefore, for centers of sightseeing tourism, there is a need for another method that will allow for tracking both foreign and domestic tourists, including day visitors. For this

purpose, specially organized statistical surveys are used. Essentially, this is a selective method of statistical research. Therefore, it is necessary to select a representative sample according to the purpose of the research. If the goal is to study the quantity and structure of visitors to a certain destination as a center of sightseeing tourism, then excursionists, both individual and organized, will be the objects of observation. However, the selective method does not involve covering the entire population. Therefore, the task of choosing the research location arises. The time of observation is also taken into account, as tourism has a pronounced seasonal character.

The determination of the observation site is reduced to the question of where to conduct the observation. The choice of this location depends on many factors, the main ones being the size of the territory and the degree of its openness. If the territory is closed, that is, it has opaque administrative or natural borders (for example, a country or a small island), and observations are carried out at entry (exit) points and on transport (buses, airplanes, cruise ships, etc.). In an open territory, region, or city, statistical observations are organized in accommodation facilities and show objects open for paid visits. All possible options are given in Table 1 (Aleksandrova, 2002).

Table 1. Choosing a location for statistical observation in tourism

Place of observation	Area					
	closed			opened		
	big	small		big	small	
	country	island	the most visited places by tourists	region	city	the most visited places by tourists
Entry (exit) point	yes	yes	no	no	no	no
Vehicle	yes	yes	no	no	no	no
Means of accommodation	no	yes	no	yes	yes	no
Display objects	no	yes	yes	yes	yes	yes

Source: Aleksandrova A. Yu. (2002)

As shown in Table 1, the center of sightseeing tourism corresponds to a small open territory, which only utilizes accommodation facilities and exhibition objects for special statistical observations. However, it has already been established that hotels and similar establishments are not suitable for accounting for cultural tourists because many of them are day-trippers who do not stay overnight in the destination. Therefore, only exhibition objects remain, which must be the most visited places by tourists.

In addition, it is necessary to take into account the time of observation, as tourist flows are not constant throughout the year and have a seasonal character. Therefore, conducting several studies, at least for each season, is necessary. The dynamics of the total number of excursionists over the years and the change in their structure are also important. The best option is the continuous collection of such information, which is possible in objects of a display open for paid visits. It is also easy to introduce information collection on where tourists came from and so on in such places.

So let's formulate the requirements for a place for statistical observation of visitors to the sightseeing tourism center and compare them with the object of the study – the city of Chernivtsi:

– it should be a place with display objects that tourists will definitely visit. In Chernivtsi, such an excursion object is the former Residence of Bukovinian Metropolitans, which belongs to the UNESCO heritage;
– it should be a place that cannot be visited independently without control. This is typical of show objects that have paid access. This is the case with the former Residence of Bukovinian Metropolitans;
– in order to determine the distribution of visitors by season, this place should be accessible to tourists throughout the year. Excursions to the former Residence of Bukovinian Metropolitans are held daily from 10 a.m. to 5 p.m. throughout the year;
– in such a place, in addition to recording visitors in natural and value indicators, other statistical information should be collected that allows for analyzing the structure of tourists, or there should be such a possibility.

Tours of the former Residence of the Bukovinian metropolitans are conducted by staff guides, who also keep statistical records of them by registering tourist groups and individuals in the tour log. They keep a daily count of tourists with structural information such as:

– the number of adult and student visitors
– the number of domestic and foreign tourists
– the countries of origin of foreign tourists.

These statistics are open for research by scientists of the Chernivtsi National University (ChNU), and their results are reliable, in particular, one of the co-authors of this article is a staff guide. It should also be noted that there are all prerequisites for using the method of special statistical observations in the study of inbound tourist flows for such a center of sightseeing tourism as Chernivtsi. The status of a UNESCO monument as a place for these observations allows us to speak about representativeness, at least for sightseeing tourism.

Results of the study

Based on the above, there are a number of tasks that can be successfully solved by this special statistical research:

1. to trace the dynamics of the number of excursion visitors to Chernivtsi National University (ChNU). To find out which factors and how they influenced these dynamics, including inclusion in the UNESCO World Heritage List, Russian aggression in 2014, and COVID-19;
2. to analyze the composition of visitors to the former Residence of Bukovinian Metropolitans based on the above structural information for separate marker years. To find out how and why the structure of excursion visitors to ChNU changed;
3. to analyze seasonality and establish the weekly cycle of excursion visits to ChNU as a whole and for separate structural segments.

Given the limited format of the scientific article, this study is divided into two parts. This publication is dedicated to the first task. The second and third tasks will be addressed in the next publication.

Using the statistical records of the Historical and Architectural Museum Complex of Chernivtsi National University, we can trace the dynamics of the number of excursion visitors from 2000 to 2021 (with some exceptions: unfortunately, data is missing for 2007–2008) (see Table 2).

Table 2. The number of visitors to the former Residence of Bukovinian and Dalmatian Metropolitans

| Years	Tourists		Years	Tourists	
	People	Increment(%)		People	Increment(%)
2000	3747	–	2011	25226	+50,19
2001	3580	–4,46	2012	49400	+95,83
2002	3729	+4,16	2013	45873	–7,14
2003	4362	+16,98	2014	54493	+18,79
2004	4837	+10,89	2015	67725	+24,28
2005	4994	+3,25	2016	85548	+26,32
2006	7705	+54,29	2017	96024	+12,25
...*			2018	94565	–1,52
2009	15341	–	2019	96517	+2,06
2010	16796	+9,48	2020	24631	–74,48
			2021	67298	+173,22

*There is no statistical data for 2007–2008.

Source: compiled by the authors based on data from the statistical records of the Historical and Architectural Museum Complex of Chernivtsi National University

As can be seen in the graph constructed from this data (see Fig. 1), there are three distinct periods within this time frame, based on the trend break. The break years are 2017 and 2019, when there was a significant impact from external factors, which we will discuss later. The first period is a sustained growth in excursion activity (2000–2017), which has a predictable pattern and can be described by a mathematical function. The second period is stagnation with slight fluctuations (2017–2019). The third period is a sharp decline (2019–2020) followed by a similar dynamic increase (2020–2021), the further character of which is unknown due to the completion of the dynamics series. In the latter case, it appears that the phenomenon was under the influence of force majeure circumstances, then partially regained its position by adapting or due to the mitigation of the negative impact of this factor.

Let's analyze them in more detail. Although we identified the first period as a period of steady and systematic growth, it is worth noting that the increase in the number of tourists from 2000 to 2017 occurred unevenly: stable slow growth with slight fluctuations, which was observed at first, after 2011 showed significant positive dynamics. Based on this, we can distinguish two sub-periods, although overall dynamics can be described by a single equation. The disadvantage of distinguishing sub-period 1.1 is the lack of data for 2007–2008. Nevertheless, we will consider it as such. From 2000 to 2010, there was a slight increase, with an average annual growth rate of visitors of +13.51%. At the same time, slight negative growth was recorded in 2001, and the maximum indicators reached +54.29% in 2006. If we operate with absolute values, then the number of tourists who visited the former Residence of Bukovinian and Dalmatian Metropolitans, although increased almost 4.5 times during this period and reached 16,796 visitors in 2010, compared to subsequent years, this increase was insignificant (only +13,049 people) (see Table 1).

Figure 1. The number of tourists during the period of 2000–2006, 2009–2021, people
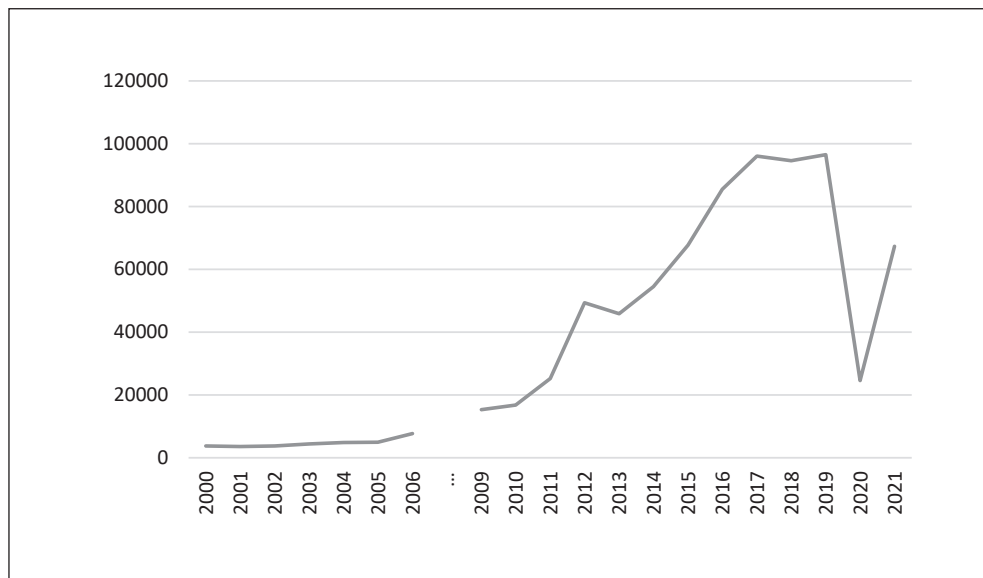
* There is no statistical data available for 2007–2008.

Source: compiled by the authors based on data from the statistical records of the Historical and Architectural Museum Complex of Chernivtsi National University

Subperiod 1.2 covered the years 2011–2017, during which there was a sharp increase in the number of tourists compared to the previous period. With an average annual growth rate of +31.5%, the number of tourists reached its maximum in 2017 (96,024 people), which is 5.7 times more than in 2010. In absolute terms, this increase amounted to nearly +80,000 people. The largest annual growth rates were observed at the beginning of this period in 2011 and 2012 (+50.19% and +95.83%, respectively). The fact that this rapid growth occurred for two years in a row indicates the non-random nature of this surge in the dynamics. Although in the following year, 2013, the phenomenon somewhat retreated in its dynamics (–7.14%), as is always the case after a frenzy, the dynamics did not return to the annual growth rates of the first subperiod, and the phenomenon reached a new level of regular growth. In particular, for four years in a row, from 2014–2017, the dynamics were positive, with an average annual growth rate of +17.91%. This indicates a qualitative change in the phenomenon itself rather than the influence of an external factor. This is supported by the fact that in this period, the dynamics can be described by the same equation as the entire first period.

So, using correlation regression analysis, we will proceed to build a trend and estimate deviations from it for the first period as a whole (see Table 3). Only based on this we can not only determine the pattern of the dynamics but also analyze which deviations were random and which were caused by something, and ultimately provide an answer as to why.

Table 3. The actual and calculated number of tourists for the period of the steady growth trend

Year	The number of the tourists		Difference	
	Factual	Theoretical	Value	σ
2000	3747	2448	1299	0,27
2001	3580	3045	535	0,11
2002	3729	3789	–60	–0,01
2003	4362	4714	–352	–0,07
2004	4837	5866	–1029	–0,21
2005	4994	7298	–2304	–0,48
2006	7705	9080	–1375	–0,28
2009	15341	17490	–2149	–0,44
2010	16796	21761	–4965	–1,03
2011	25226	27075	–1849	–0,38
2012	49400	33687	15713	3,25
2013	45873	41914	3959	0,82
2014	54493	52150	2343	0,48
2015	67725	64886	2839	0,59
2016	85548	80731	4817	1,00
2017	96024	100447	–4423	–0,91
		σ (сігма)	4840	

Source: calculated by the authors based on the statistical records of the Historical and Architectural Museum Complex of Chernivtsi National University

As we can see from Fig. 2, the growth in the number of tourists during the period from 2000 to 2017 had a predictable pattern that can be described by the exponential function y = 4E-187e0,2185x. Almost all the actual data points were well approximated by the trend line, with an R2 value of 0.9715. Based on the established function, we calculated the theoretical number of tourists for each year of the study, as well as the deviation of the actual number of visitors from the theoretical one. For the latter, we calculated the standard deviation and assumed that deviations that were less than or close to 1 sigma were random, while deviations greater than 1 sigma were caused by certain factors or a qualitative change in the phenomenon itself. According to Table 3, the deviations were practically random for almost all the years in the defined period, with the exception of 2012, when it reached 3.25 sigma, indicating that something extraordinary had happened. On June 28, 2011, at the 35th session of the UNESCO World Heritage Committee, a decision was made to include the architectural ensemble of the Residence of Bukovinian and Dalmatian Metropolitans in the list of world heritage sites. Since then, the trend has changed – the growth has become more intense (see Fig. 2) compared to the hypothetical trend (lower curve), which was calculated based on the data up to 2012. There was a qualitative change in the phenomenon itself. That's why the trend sharply increased and continued to grow until 2017.

Figure 2. The actual (upper) and hypothetical (lower – without including the object in the UNESCO) trend of steady growth in the number of tourists
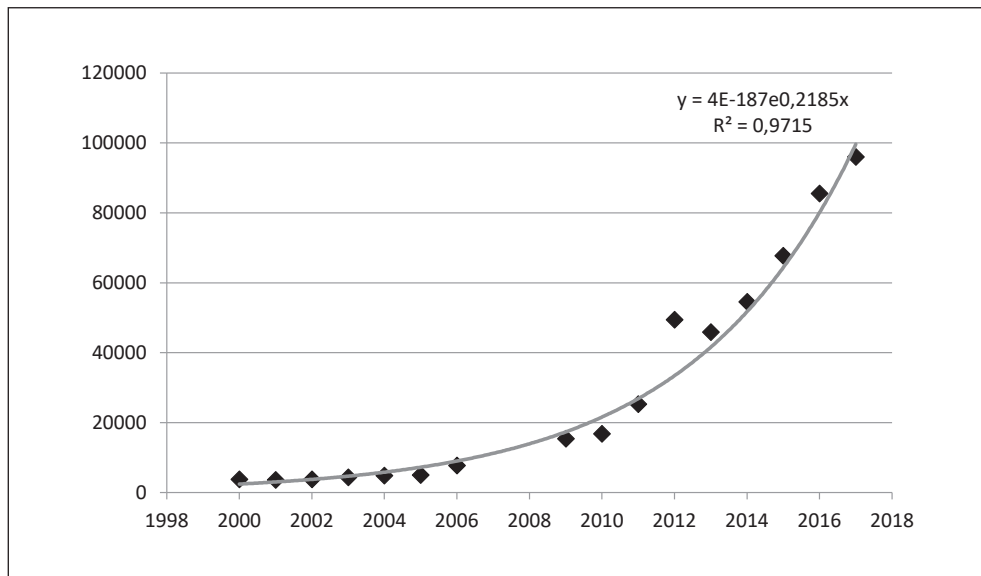
Source: calculated by the authors based on the statistical records of the Historical and Architectural Museum Complex of Chernivtsi National University

The period between 2017 and 2019 was marked as a period of excursion stagnation, during which the number of visitors fluctuated between 94.5–96.5 thousand people with meager annual growth rates that barely reached +0.25% on average. This two-year plateau broke the trend of steady and regular growth and became an extreme point for this dynamic range. Such a shift may only be a consequence of epochal changes. This shift in the military-political and socio-economic situation in Ukraine is evident, namely the Russian aggression in Donbas. However, a number of questions arise: why did this period of stagnation begin later rather than immediately after 2014? Why did the subsequent three years, categorized as the initial phase of consistent and substantial expansion, exhibit positive annual growth rates averaging over 20%? Undoubtedly, these questions necessitate comprehensive explanations.

Based on episodic surveys of excursionists, guides heard that tourists from Kyiv (who make up about 50% of visitors to Chernivtsi) used to prefer weekend trips to Crimea, particularly during the May holidays. This allowed us to put forward a hypothesis that this three-year lag between the beginning of the period of stagnation and the possible factor that led to it is explained by the Russian occupation of Crimea and the resulting redistribution of excursion flows within Ukraine, including in favor of western Ukraine, including Chernivtsi.

To verify this, it is worth analyzing the dynamics of visitors to the Residence of Bukovinian and Dalmatian Metropolitans during the May holidays against the total number of tourists (see Table 4). Under stable conditions, it is expected that annual increases, as well as increases from one month to the same month of the previous year, should be similar. If the May holidays are a driver of growth in the number of tourists, then a higher increase compared to the annual growth rate is expected for this month.

Table 4. Number of tourists at the former Residence of the Metropolitans of Bukovyna and Dalmatia, total and in May

Years	General number of tourists	Increment	Number of tourists in May	Increment
2012	49400	95,83	8160	–
2013	45873	–7,14	6739	–17,41
2014	54493	+18,79	7504	+11,35
2015	67725	+24,28	11207	+49,35
2016	85548	+26,32	10840	–3,27
2017	96024	+12,25	13247	+22,20
2018	94565	–1,52	13295	+0,36
2019	96517	+2,06	13898	+4,54

Source: calculated by the authors based on the statistical records of the Historical and Architectural Museum Complex of Chernivtsi National University

The record increase during the May holidays was observed in 2015 when almost 50% more people visited the Residence compared to the previous year, 2014. However, the total number of tourists in 2015 showed only a two-fold increase compared to the previous year (+24.28%). Although there was a negative growth rate (–3.27%) for the May period in 2016, this does not indicate a decrease in interest in the monument, but rather a correction of the previous high demand (as happened in 2013 with the annual number of tourists after the inclusion of the Residence in the UNESCO heritage list). This correction does not reject the phenomenon at the previous positions (2014) but leaves it at a new higher level. Furthermore, from 2016 to 2019, the growth rate during the May holidays was always approximately twice as high as the average growth rate for the year as a whole (in 2017, +22.2% in May compared to +12.25% for the year; in 2018, +0.36% compared to –1.52%; and in 2019, +4.54% compared to +2.06% on average for the year). Therefore, the statements of tourists about their reorientation in favor of Chernivtsi, primarily during the May holidays, are confirmed by statistics. It also becomes evident that this trend persisted for several years.

However, these results are insufficient for reliable conclusions about the redistribution of cognitive internal tourist flows in favor of Chernivtsi since the survey of tourists was episodic and unsystematic. An attempt was made to identify this at the national level to increase the statistical mass. For this purpose, the dynamics of the number of tourists arriving at the Residence of the Metropolitans were compared with the dynamics of the number of tourists accommodated in hotels in Ukraine for a similar period (see Fig. 3–4). Of course, it would be more accurate to compare with the dynamics of the total number of tourists in Ukraine. However, the number of tourists accommodated in hotels was chosen due to the lack of such statistical data. We chose to consider the period from 2013 to 2019, which covers both a period of predictable growth and a period of stagnation. Since the turning point that triggered the redistribution of internal tourist flows was obviously 2014, it was worth considering the situation before that. The year 2013 was chosen as the starting year for analysis not by chance, as the previous year, 2012 was marked by a surge in demand after the inclusion of the Residence of the Metropolitans of Bukovina and Dalmatia in the UNESCO heritage list, which resulted in a deviation from the regression line (see Fig. 2) of 3.25σ, whereas in the following year, the situation

Figure 3. Number of tourists in the Residence of the Metropolitans, *individuals*
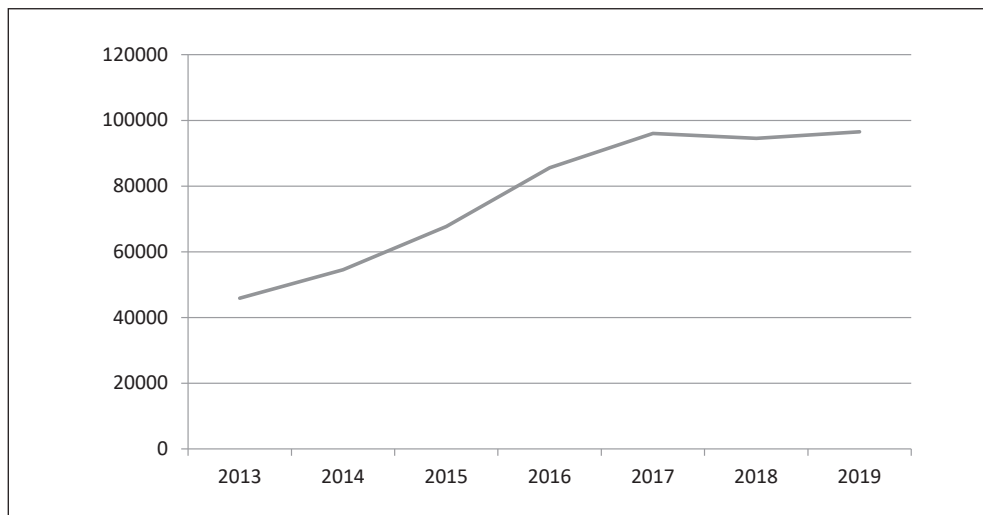
Source: calculated by the authors based on the statistical records of the Historical and Architectural Museum Complex of Chernivtsi National University

Figure 4. The number of tourists accommodated in hotels in Ukraine, *individuals*
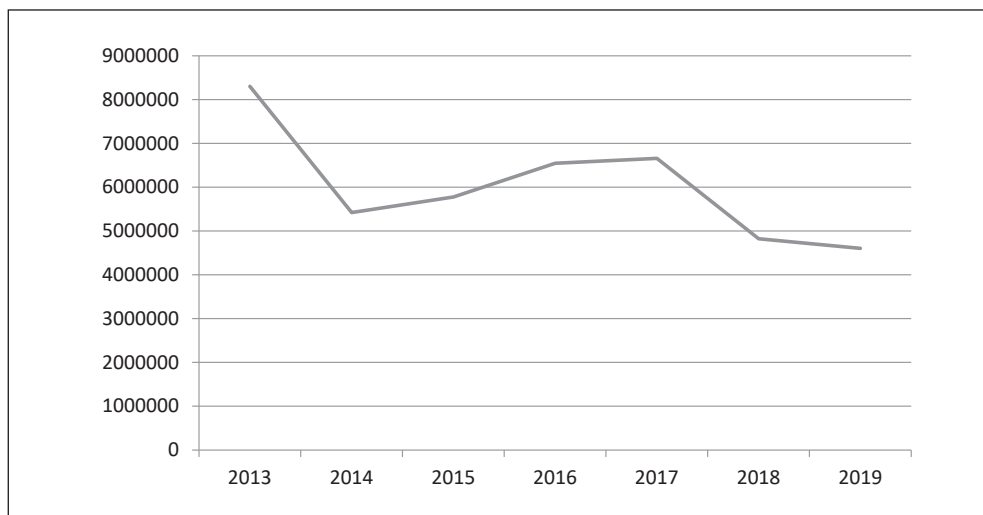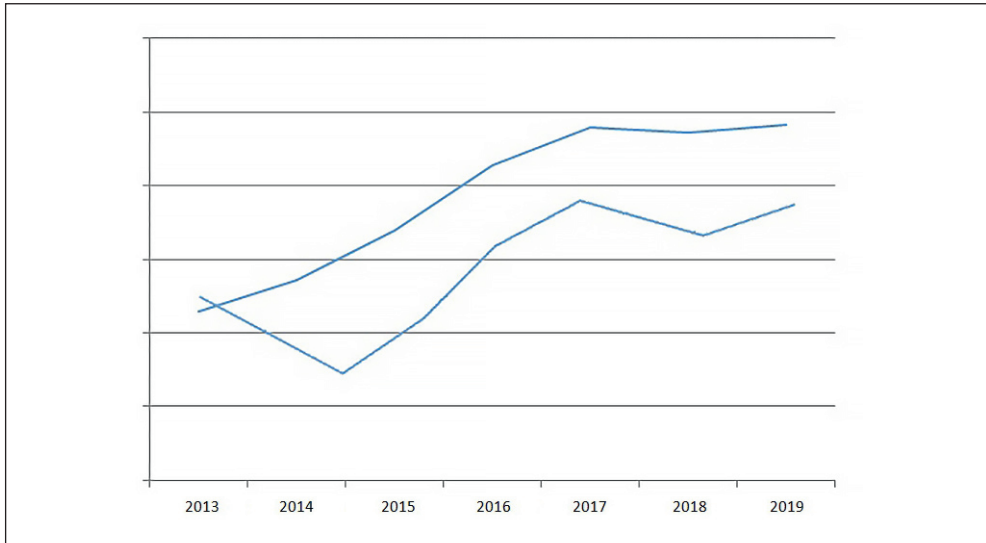

Source: constructed by the authors based on statistical data from the annual reports "Tourist Activity in Ukraine for 2013–2019"

stabilized and the deviation was less than 1σ (0.82). Therefore, 2013 is the most representative year for analyzing the situation before and after 2014.

At first glance, it may be difficult to compare the graphs presented above (see Figures 3–4), but if the curve representing the number of people staying in hotels in Ukraine is rotated 25 degrees counterclockwise and placed next to the curve representing the number of tourists in the Residence of Metropolitans, we will see practically identical graphs with minor exceptions (see Figure 5).

Figure 5. Graphs of the number of people staying in hotels in Ukraine (rotated 25 degrees counterclockwise) and tourists in the Residence of Metropolitans

Source: constructed by the authors based on statistical records of the Historical and Architectural Museum Complex of Chernivtsi National University and statistical data from the annual reports "Tourist Activity in Ukraine" for the years 2013–2019

It is quite obvious that there was a sharp decline in the number of hotel guests from 2013 to 2014 (53%). The trend of increasing numbers of hotel guests in Ukraine, which has been observed since 2014, can be explained by the relative stabilization of the military-political situation in Ukraine due to the signing of the Minsk Agreements in February 2015. However, the number of people staying in hotels in Ukraine has not returned to previous levels (see Figure 4). Under the aforementioned condition, when one of the graphs is rotated 25° counterclockwise, both curves are almost synchronous (see Figure 5). Here we get the long-awaited answer to the question of why in 2017, there was a period of stagnation in the number of tourists in the Residence of the Metropolitans: this happened due to the trend of a general decrease in the total number of tourists within Ukraine. Therefore, the reason should be sought at the nationwide level.

It remains to be clarified what it means to rotate the graph by 25° against the background of another coordinate system. From the point of view of a linear function, this is a change in the angular coefficient, which will be reflected in a change in the intensity of the function's growth rate with respect to the argument. That is, we are talking about a change in the intensity of the dynamics of annual growth. And this can be explained as follows: when there is a slow increase in the total number of hotel guests in Ukraine, the number of visitors to the Residence of the Metropolitans increases significantly more intensively; when there is a moderate decrease in the number of hotel guests in Ukraine, there is stagnation in the dynamics of visitors to the Residence of the Metropolitans. Such a pattern of consistency in dynamics can only be explained in one way: as a result of the annexation of Crimea by Russia and its military aggression in the Donbas, there was a redistribution of tourist flows in Ukraine in favor of other regions, including Chernivtsi.

The third period is based on the foundation of the previous years, as the Russian aggression in Donbas did not stop. It covers 2020 and 2021 and was caused by a global force majeure circumstance – the COVID-19 pandemic. When the coronavirus reached Ukraine in 2020 and strict quarantine restrictions were introduced, the number of tourists decreased almost 4 times compared to the previous year (–71,886 people or –74.48%). However, in the following year, 2021, the number of visitors to the former Residence of Bukovinian and Dalmatian Metropolitans increased by 42,667 people (+173.22%), reaching over 67,000 people. To understand the dynamics over these two years, it should be analyzed monthly and compared with the waves of the pandemic against the background of quarantine measures that were introduced at that time. This analysis may be limited to Ukraine, as about 90% of tourists are domestic visitors (see Table 5).

Table 5. Structure of visitors-tourists of the Residence of Bukovinian and Dalmatian Metropolitans in 2000–2006, 2013–2021

Years	Total amount of tourists	Including Ukrainians			Foreigners	
		Individuals	Increment (%)	Fraction	Individuals	Increment
2000	3747	3154	–	84,17	603	–
2001	3580	2995	–5,04	83,66	586	–2,82
2002	3729	3250	+8,51	87,15	479	–18,26
2003	4362	3785	+16,46	86,77	577	+20,46
2004	4837	3901	+3,06	80,65	936	+62,22
2005	4994	4473	+14,66	89,57	521	–44,34
2006	7705	6314	+41,16	81,95	1391	+166,99
...	...	...	...	...	...	...
2013	45873	40370	–	88,00	5503	–
2014	54493	52514	+30,08	96,37	1979	–64,04
2015	67226	65207	+24,17	97,00	2019	+2,02
2016	85577	81637	+25,20	95,40	3940	+95,15
2017	96024	89740	+9,93	93,46	6284	+59,49
2018	94565	85115	–5,15	90,01	9450	+50,38
2019	96517	86265	+1,35	89,38	10252	+8,49
2020	24631	23607	–72,63	95,84	1024	–90,01
2021	67298	65458	+177,28	97,27	1840	+79,69

...for the years 2007–2012, statistical data on the distribution of tourists by countries is absent.

Source: compiled by the authors based on statistical data of the Historical and Architectural Museum Complex of Chernivtsi National University

It is expected that the monthly dynamics of tourists may depend on the number of COVID-19 cases. However, it is incorrect to compare these two-time series because the number of tourists is not evenly distributed throughout the year but seasonally. Therefore, in correlation regression analysis, it is necessary to take into account seasonal fluctuations in the dynamics of tourists. To do this, monthly deviations of the actual number of tourists from the same number for the years before the pneumonia outbreak can be taken. The years 2017–2019 are ideal for this role – a period of tourist stagnation when the number of visitors fluctuated with minimal annual growth. This plateau in the dynamics allows for the calculation of the average monthly number of tourists for these

three years, which increases the representativeness of the results, and then extrapolate these results to the pandemic period assuming that if it were not for COVID-19, they would be the same because, for the previous three years, a horizontal trend was established with minimal fluctuations.

In this way, it seems possible to identify the impact of the dynamics of patients with atypical pneumonia on the corresponding monthly number of tourists. As mentioned, this analysis may be limited to Ukraine. However, the question arises as to which dynamics of patients should be taken into account: in the Chernivtsi region, where tourists are heading, or in Ukraine, where they come from? Since there is no clear answer, these two options were chosen. On the other hand, deviations in the number of tourists in 2020 and 2021 from their average number for 2017–2019 were also taken into account. All these dynamics series were compared on graphs (see Fig. 6, Fig. 7) and using correlation-regression analysis (see Table 6, Table 7).
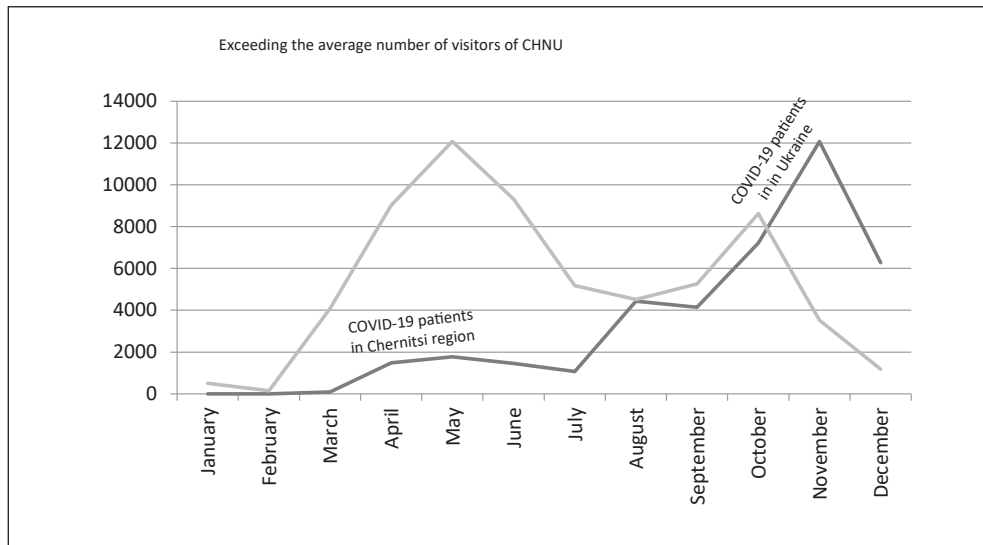
Table 6. Average monthly distribution of tourists in the Residence of Metropolitans before the pandemic, distribution of tourists and COVID-19 cases in 2020

Month	2017–2019	2020			Exceeding the average number of tourists for 2017–2019 compared to the number in 2020
	Average number of tourists from Ukraine	Number of diseases		Number of tourists from Ukraine	
		Ukraine	Chernivtsi region		
January	3699	0	0	3199	500
February	2533	0	0	2384	149
March	5041	645	90	949	4092
April	9026	9761	1481	0	9026
May	12115	13266	1778	37	12078
June	10310	20662	1452	997	9313
July	8632	25550	1074	3460	5172
August	8998	51331	4428	4486	4512
September	7844	87744	4143	2588	5256
October	11791	178522	7212	3160	8631
November	4671	345144	12074	1146	3525
December	2381	322422	6285	1201	1180
Correlation coefficient		−0.02	−0.02		

Source: compiled and calculated by the authors based on data from the statistical records of the Historical and Architectural Museum Complex of Chernivtsi National University and Coronavirus in Ukraine. Chernivtsi region. Statistics. Ministry of Finance

As seen in Figure 6, the monthly distribution of the excess of the average number of visitors to the Residence of the Metropolitans in 2017–2019 over their number in 2020 does not align well with the monthly distribution of COVID-19 cases registered in the same year in Chernivtsi region and in Ukraine as a whole. This is indicated by the correlation coefficients (see Table 4). This can be explained by the fact that at the beginning of 2020, when the first cases of the disease were recorded in March, a strict quarantine was introduced.

Figure 6. Graphs of the monthly distribution of COVID-19 cases in 2020 and the excess of the average number of tourists in the Residence of the Metropolitans over their monthly number in 2020 compared to 2017–2019 (left axis for Chernivtsi region, right axis for Ukraine)

Source: compiled and constructed by the authors based on the statistical data of the Historical and Architectural Museum Complex of Chernivtsi National University and Coronavirus in Ukraine. Chernivtsi region. Statistics. Ministry of Finance

Table 7. Average monthly distribution of visitors to Chernivtsi National University before the pandemic, distribution of visitors and COVID-19 cases in 2021

Month	2017–2019	2021			Exceeding the average number of tourists for 2017–2019 compared to the number in 2021
	The average number of tourists from Ukraine	Number of diseases		number of tourists from Ukraine	
		Ukraine	Chernivtsi region		
January	3699	164408	0	2643	1056
February	2533	128394	9277	1541	992
March	5041	326319	15050	1260	3781
April	9026	395369	7282	2569	6457
May	12115	132957	2120	9286	2829
June	1030010	32602	697	9547	763
July	8632	17689	234	8622	10
August	8998	33511	1527	10650	−1652
September	7844	137083	7230	6904	940
October	11791	498923	17471	8111	3680
November	4671	516079	9348	2545	2126
December	2381	229268	3632	1780	601
Correlation coefficient		0.71	0.57		

Source: Compiled and calculated by the authors based on the statistical records of the Historical and Architectural Museum Complex of Chernivtsi National University and Coronavirus in Ukraine. Chernivtsi region. Statistics. Ministry of Finance

Figure 7. Graphs of monthly distribution of COVID-19 cases in 2021 and excess of the average number of visitors to the Residence of Metropolitans over their monthly number in 2021 (left scale for Chernivtsi region, right scale for Ukraine)
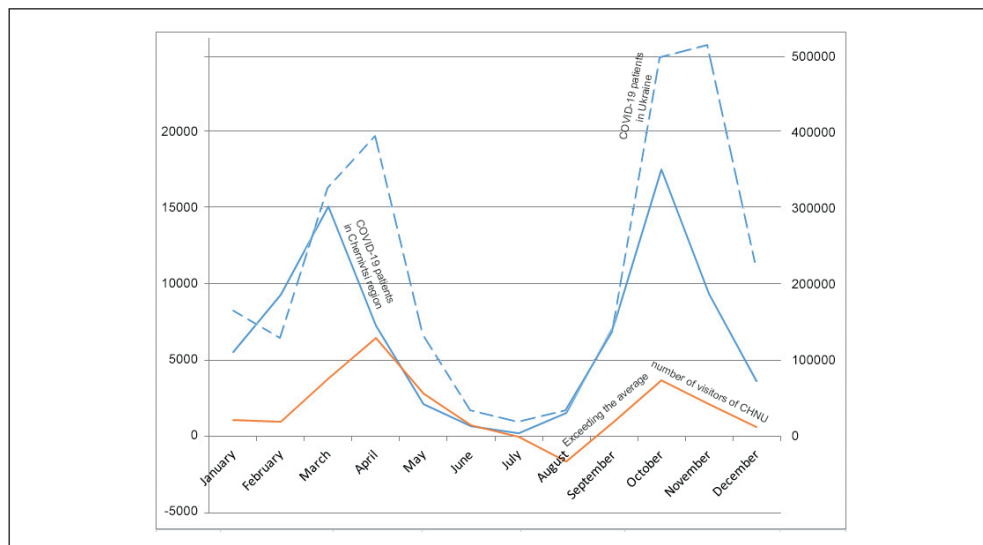
Source: compiled and constructed by the authors based on the statistical data of the Historical and Architectural Museum Complex of Chernivtsi National University and Coronavirus in Ukraine. Chernivtsi region. Statistics. Ministry of Finance

Therefore, at the beginning of the pandemic, when there were still few cases, the number of visitors to the former Residence of the Metropolitans in April decreased to zero. Specifically, the first case was recorded in the Chernivtsi region on March 2, and on April 1, a special regime of entry and exit was introduced in the region, with a strict quarantine declared on April 4. Almost two months later, at the end of May, visitors were allowed to return to the former Residence of the Metropolitans. After a slight easing of the quarantine in the Chernivtsi region on July 13, the number of visitors increased noticeably (see Table 6). Therefore, in 2020, no correlation was observed between the studied phenomena, because the monthly dynamics of visitors, considering seasonality, depended not on the number of COVID-19 cases, but on the announcement or easing of quarantine measures, which had a preventive character.

A mechanism of quarantine measures was developed in Ukraine, which involved tightening or loosening restrictions on activities and movement depending on the objective epidemiological situation in a particular region (color zoning). As a result, in 2021, a correlation was observed between the dynamics of excursion visits to the Residence of Metropolitans and the monthly number of COVID-19 cases, taking into account seasonality and the number of infected people. This is indicated by the synchronization in the graphs (see Figure 7) and correlation coefficients (see Table 7). Specifically, the correlation between the monthly excess of the average number of tourists in the Residence of Metropolitans in 2017–2019 over their number in 2021 and the monthly number of COVID-19 cases was strong both for the Chernivtsi region (correlation coefficient = 0.57) and for Ukraine as a whole (0.71).

CONCLUSIONS

The research conducted on the example of Chernivtsi city and its UNESCO heritage site has shown that in centers of sightseeing tourism with a highly attractive object, the accounting of visitors to this object is representative for determining the quantity and dynamics of tourist arrivals. This study was dedicated to analyzing the dynamics of excursion visits to the UNESCO World Heritage Site – the former Residence of Bukovinian Metropolitans – and identifying factors that contribute to or hinder tourism activity during the period from 2000 to 2021. The most significant triggers were found to be the inclusion of the site on the UNESCO list, the annexation of Crimea by Russia in 2014, and the COVID-19 pandemic.

By analyzing the statistical accounting data of visitors to the Historical and Architectural Museum Complex of Chernivtsi National University, three periods of excursion activity were identified. *The first time period* was the longest (2000–2017) and had a predictable character that could be described mathematically. Since 2012, it has been characterized by rapid growth due to the inclusion of the former Residence of Bukovinian Metropolitans on the list of UNESCO World Heritage Sites.

The second period (2017–2019) was characterized by *excursion stagnation* with slight fluctuations in 2018. Excursion activity reached its maximum level during the entire research period and remained at approximately the same level during this time period. Based on the analysis conducted, we put forward and confirmed the hypothesis that the *annexation of Crimea* by Russia in 2014 had an impact on the redistribution of excursion flows to different regions of Ukraine, particularly in favor of the west, where Chernivtsi is located.

The third period (2019–2020) was marked by a sharp decrease in the number of visitors to the former Residence of Bukovinian Metropolitans, followed by a similar dynamic increase (2020–2021), which was caused by *force majeure circumstance of global scale – the COVID-19 pandemic.* Through correlation analysis, we confirmed the dependence of excursion activity on the quarantine restrictions imposed by the authorities. However, in 2021, the dynamics of visitor activity, taking into account seasonality, directly depended on the number of COVID-19 cases.

The study period did not include the beginning of the full-scale war of Russia against Ukraine, which started on February 24, 2022. However, the fact that Chernivtsi is located in a relatively safe western part of the country and received over 100,000 internally displaced persons with the onset of the Russian aggression is undeniable. Therefore, it is clear that the number of Ukrainians who first found themselves in a city with a unique world heritage site and expressed a desire to visit it increased rapidly. However, at the time of writing this article, the authors did not have complete information on the excursion activity in 2022. This will be the subject of further research, as well as the analysis of the composition of tourists to the former Residence of Bukovinian Metropolitans by age structure and belonging to a particular country for certain marker years, as well as the study of seasonality and the establishment of weekly cycles of excursion visits to Chernivtsi National University as a whole and for individual structural segments.

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