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GEOGRAPHICAL AND COMPONENT ANALYSIS OF THE PERCEPTION OF THE TOURISM AND RECREATIONAL SPACE OF THE PERM REGION

Abstract: The relevance of this study lies the reassessment of the role that an information plays in the functioning and perception of tourism and recreational space. Tourism and recreational space perceive as global but it has a complex structure, represented in the form of territorial tourism and recreational systems. In a post-industrial society the importance of information for the development of tourism and recreational space is constantly increasing. Oftentimes tourists base on other tourist's information and reviews posted on the Internet, recorded in the form of digital footprints on specialized portals to make a decision to travel. The consumer perceives the tourism and recreational space of the region as a set of reviews and ratings the content of which may be different from the actual parameters of the space. These feedbacks last as a basis for the expectations and impressions formation. The purpose of this study is a component and geographical analysis of the perception of the tourism and recreational space of the Perm region using the method of text analysis of big data. The textual analysis of 5,668 reviews that have posted on the Tripadvisor website was carried out on the PolyAnalyst platform and included the calculation of the sentiment index, the extraction of keywords and the determination of the relationship of the terms to define the key attributes of the tourist and recreational space perception. The component analysis of the Perm region's tourism and recreational space perception showed the uneven perception of its individual components and made it possible to identify the most topical problem areas. The assessment of the perception of tourist and recreational space by consumers from different places of residence, as well as the assessment of the territorial features of the perception of individual cities of the Perm region, was carried out using geographical analysis. Additionally, the sentiment index change from 2014 to 2021 was assessed. An analysis of this change made it possible to identify the incipient negative trends at the deterioration of the region's tourism and recreational space perception. The results of the study will be useful for the development of strategic documents on territorial planning and tourism management, improvement of regional tourism products and the image of the region.

Key words: tourism and recreational space, Perm region, text analysis, tourists' reviews, Tripadvisor, PolyAnalyst

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Introduction

Tourism and recreational space are perceived as global (Kruzhalin, 2008), which is based on territorial tourism and recreational systems of various hierarchical levels (Mazhar, 2014). The formation of tourism and recreational space is influenced by a combination of many factors and conditions. The degree of influence of factors differs for individual components of the tourism and recreational system, and, moreover, depends on the stage of development of society.

In the modern information society an increasing number of potential tourists at the stage of planning a trip, when choosing a destination, hotel, excursions, pay attention to the recommendations of other travellers (Banerjee & Chua, 2016). At the same time, there is a higher degree of trust in the reviews left by other travellers than in the information posted on the official websites of the organization (Simeon et al., 2017). Often, reviews contain exactly the information that will reduce the risks of uncertainty and getting negative impressions while traveling (Berezina et al., 2016).

Most tourism organizations and recreational complexes deal with the analysis of visitor reviews. In addition, understanding the importance of the totality of impressions for the development of the tourism industry, the analysis of feedback from visitors to the destination becomes relevant for improving the effectiveness of regional tourism policy. The perception of tourism and recreational space can differ significantly from the properties of the real one and be more stable. A large number of negative reviews can scare away potential tourists, who increasingly rely on someone else's opinion, recorded in the form of a digital footprint on specialized sites, when planning a trip. Often a negative image can be more persistent and it is not possible to correct it only by eliminating the problem in real space. Obviously, digital footprints of tourists including texts of reviews, photographs, geolocation marks, etc., form a huge information field, which can only be analysed using special programs and big data processing methods (Yang et al., 2015). In this regard, text analysis methods allow solving the existing problems of processing large databases.

The purpose of the article is to test the methodology of component and geographical analysis of the perception of tourist and recreational space using the method of text analysis of big data. The authors also conducted a study of the perception of the tourist and recreational space of the Kirov, the Kaliningrad and the Perm region.

Materials and Methods

Interest of using the big data in research is steadily growing. The methodology and research tools are being improved, the geography of scientific research and the coverage of the components of the tourism industry are expanding (Li et al., 2018). The big data using in economic and humanitarian research shows good results (Mayer-Schönberger & Cukier, 2013) which could be used to improve the efficiency of tourism organizations (Tanner, 2014). It should be noted that people voluntarily participate in the formation of big data, through the issuance of loyalty cards for shops, hotels and other service institutions. In return, they receive benefits and personalization of the offer (Anshari et al., 2019). The methodology based on the using the Google Analytics service for predicting the tourist flows based on the analysis of data on website traffic is also widely used (Gunter & Önder, 2016). At the same

time, there is growing criticism of research aimed only at quantifying data (numbers, proportions and averages) (Weaver, 2021).

The value of textual information, which contains an emotional assessment of the perception of the components of the tourism and recreational space, is increasing. Computational linguistics, visual analytics, and deep learning methods are widely used to analyse unstructured data. Available technical and software tools allow processing text reviews left by visitors on various platforms (Chang et al., 2020). A methodology is being developed to create robust lexicons that can be used to analyse big data to understand and predict customer sentiment (Bagherzadeh, 2021). Much attention is paid to the reliability of the data obtained and verification of the identified patterns (Han, 2021).

The formation of a database is of great importance for the study. The source of big data for text analysis of traveller reviews can be social networks, data from mobile operators, banks, and various search engines. The most valuable are reviews that have an emotional assessment and are stored in their original form in the information field. Often, negative reviews of tourists left on social networks or on the official page of the organization on the Internet are deleted by the owners of the resource. TripAdvisor is the most trusted by users (Gretzel & Yoo, 2008). Potential tourists evaluate the reviews posted there as reliable (Schuckert et al., 2015).

Most often, users leave reviews with general impressions about the destination and about those components of the tourism and recreational space with which they most often interact during the trip and which evoke certain emotions. In accordance with the structure of the trip, these components include accommodation, food, transport and entertainment.

The hotel sector receives the maximum number of reviews. Therefore, hotels earlier than others began to analyse reviews to build relationships with consumers of services (Melián-González, 2013). We study the reactions of hotels to positive and negative feedback from guests (Park & Allen, 2013). The influence of the content of reviews on the choice of a hotel when planning a trip is assessed (Ye et al., 2011).

The catering sector is most closely associated with the hotel sector. Big data analysis helps restaurants improve management and sales efficiency, improve the financial stability of the organization (Fernandes et al., 2021). Decision-making models are being developed in the choice of a restaurant by the consumer, based on the analysis of quantitative and textual indicators (Zuheros et al., 2021). A new software tool is proposed for mass data analysis in order to determine the tone of reviews and predict the behaviour of potential restaurant visitors (Agüero-Torales et al., 2019).

Transport service in the composition of the tourist product occupies a special place. Often the largest number of negative reviews left by travellers relate to transport infrastructure. The perception of railway transport and the subway is explored. The convenience of buying tickets, service on the way, the architecture of railway stations and stations, meals on the road and more are evaluated (Taecharungroj, 2022). Various aspects of airlines and airports are studied (cleanliness, in-flight food and drink and entertainment, customer service, check-in and landing) (Park et al., 2020).

A relatively new direction is the evaluation of sights. The complexity of such an assessment is that the sights themselves in most cases do not provide commercial services. Therefore, other review attributes are selected for evaluation. Depending on the features of the

tourism and recreational potential of the destination, with the help of machine analysis, features of the perception of beaches, islands, streets, markets can be identified (Taecharungroj & Mathayomchan, 2019). A typology of tourists is carried out based on the geography of visitors, interests, motivations and their activities at the destination (Kirilenko et al., 2019). It should be noted that big data text analysis methods are also actively used to assess the impact of COVID-19 on customer satisfaction (Nilashi et al., 2022).

Despite the relevance of studying the reviews of consumers of tourist services and the well-developed methodology for text analysis of big data, such studies have practically not been carried out in relation to the tourism and recreational space of Russia. Individual tourist attractions are being explored, such as Red Square in Moscow (Kirilenko et al., 2021). With the use of Tripadvisor materials, reviews are analysed from the point of view of gender and ethno-linguistic aspects (Alekseeva et al., 2016). Based on feedback data posted on Tripadvisor, a model is being developed to engage consumers in value co-creation (Korelina & Owner, 2015). Based on the reviews of tourists about hotels, restaurants and attractions, a quantitative assessment of the attractiveness of the cities of the Baltic region is given (Rakhmanov, 2019) and assesses the level of competitive advantages of services at catering establishments in the city of Kursk (Minakova et al., 2019).

Basically, in these studies, a quantitative assessment of enterprises of the tourism and recreational complex is carried out according to user estimates. At the same time, textual analysis of the content of reviews is not carried out, their tone and key aspects are not determined, and the features of recreational behaviour of various social and age groups of consumers are not analysed. In addition, the studies are fragmented, do not cover all components of the tourism and recreational space, so it is impossible to assess the mutual influence of negative or positive reviews. Also, an assessment of the change in the attitude and perception of the tourism and recreational space over time and taking into account the regional affiliation of consumers can become an actual direction in the study of big data and text analysis in tourism.

The methodology for studying the perception of the tourism and recreational space of the region includes a component and geographical analysis of the reviews of tourists and recreants collected on the Tripadvisor portal. Tourist feedback is an impression captured in the form of a digital footprint. Text analysis allows you to determine the emotional tone of the impression, which is extremely important for identifying problem areas of the tourism and recreational space.

Stages of the study:

1. Collection of data and formation of a database of reviews of visitors to the institutions of the tourism and recreational complex of the Perm region. The database includes 5,668 reviews left by customers from 2014 to 2022. All reviews were divided into groups corresponding to the components of the tourism and recreational space: accommodation, entertainment, food, tourist product, transport (Table 1).

Tab. 1. Quantitative characteristics of the research base for component analysis

Category	Type	Number of reviews	Total reviews by category
Accommodation	Hotels	1,102	1,102
Entertainment	Art objects	304	2,293
	Gallery	244	
	Museum	215	
	Monuments and statues	750	
	Cave	326	
	Theatre	454	
Nutrition	Restaurant	1,019	1,019
Tourism product	Tour operator	88	207
	Tour agent	119	
Transport	Airport	530	945
	Railway station	371	
	Cruise	44	
Territory	City	102	102
Total			5,668

2. Automatic cleaning and classification of tourist reviews about the components of the tourism and recreational space. The operation was carried out using the PolyAnalyst program. This software platform from Megaputer is used for visual development of data and text analysis scenarios, as well as for building interactive reports (Figure 1).

3. Integral and component assessment of the perception of tourism and recreational space. The PolyAnalyst platform was also used at this stage. In addition, the sentiment index was calculated as the ratio of positive and negative reviews, keywords were extracted, and the relationship of terms was determined to determine the key attributes of the perception of tourism and recreational space.

The Sentiment Analysis allows to evaluate the attitude of the reviewer to a particular object or situation. Evaluation is an emotionally coloured judgment of the subject (tourist or recreant) in relation to the object (component of the tourist and recreational space). Built-in sentiment analysis algorithms determine the number of negative and positive reviews for each object of evaluation. For this, words are analysed, most often adjectives, which correlate with the object of evaluation and have their own degree of negativity (from -1 to -5) and positivity (from +1 to +5). The ratio of the number of positive and negative reviews is called sentiment index. The functionality of the node provides the ability to build a graph to visualize the results obtained about the relationship of the subject to the object. In the constructed graph, aspects (areas) of the study are indicated by a grey punch, positive sentiments are displayed in green, and negative sentiments are displayed in red. An analysis

of the change in the sentiment index over time can be the basis for making managerial decisions, both in relation to individual components, and to the sphere of recreation and tourism as a whole.

4. Geographical analysis of the territorial features of the perception of tourism and recreational space. To identify territorial features, the “search queries” tool was used. With its help, reviews were filtered and further grouped by belonging to a particular place. The largest number of responses was left by respondents in relation to the cities of Perm, Kungur, Solikamsk, Gubakha. Subsequently, a textual analysis of the databases of reviews about the cities of the Perm region was carried out. The territorial features of the distribution of the parameters of the tonality of reviews, keywords, key problems are revealed, the most popular tourist sites are identified. Additionally, reviews of tourists and recreants from four groups were evaluated: residents of Moscow and St. Petersburg, residents of the Perm region, residents of other regions of Russia, and foreign tourists.

4. At the final stage, an analysis was made of changes in the sentiment index of reviews over the years, which made it possible to identify changes in the key problems of the development of real tourism and recreational space in dynamics.

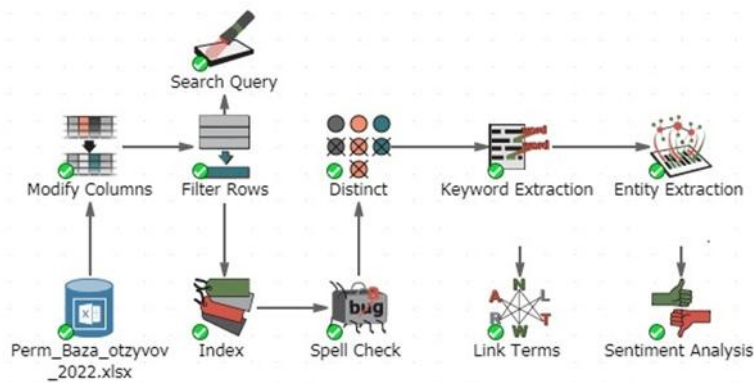


Fig. 1. General scheme of text analysis of tourist reviews in the PolyAnalyst platform

Study Limitations:

- 1) An uneven number of reviews by selected categories and time periods.
- 2) Not all tourism and recreational enterprises are registered on the Tripadvisor platform.
- 3) As a rule, the digital footprint is fixed in relation to those components with which the tourism and the recreant interact and which evoke certain emotions. The feedback base did not include components of the real tourism and recreational space with which there is no interaction during a tourist trip or vacation (for example, an organizational and managerial component). A small numbers of reviews about recreational areas, natural attractions.
- 4) During the study, reviews of tour operators and travel agents were downloaded from the official websites of these organizations, since they are not available on

the Tripadvisor platform. Such a component as “territory” was not analysed due to the small number of reviews.

- 5) Geographical analysis of consumer reviews is difficult due to the complete or partial anonymity of many users.

The identified limitations narrow the time range of the study, make certain adjustments in the interpretation of the results for individual components of the tourism and recreational space, however, in our opinion, in general, they do not have a significant impact on achieving the goal.

Results

The Perm region is not a traditional tourist area. Despite this, after the collapse of the USSR and as a result of the “opening” of the region for foreign tourists, the value of the tourist flow began to grow. Some types of tourism and tourist facilities have become popular both at the Russian (active, excursion tourism) and at the world level (cultural and educational). The growth of tourist attractiveness was facilitated by the territorial diversity of nature, cultural wealth and the purposeful efforts of local authorities. Not the last role was played by the geographical location, in particular, being on the Trans-Siberian Railway and on the banks of the large Kama River.



Fig. 2. Change in the share of the Perm region among the regions of Russia in terms of the volume of services provided by enterprises in the tourism industry (compiled by the author, EMISS source <https://www.fedstat.ru/organizations/>, accessed 25.01.2022.)

Most of the city's visitors are business tourists, which is no coincidence, given the abundance of mining, manufacturing and other industrial enterprises in the region. The contribution of tourism industry enterprises to the GRP of the Perm region is about 1% (Permstat).

Despite some success in the development of tourism in the Perm region, it should be noted that since 2010, the share of the region in terms of the volume of services rendered by enterprises of the tourism and recreational complex has been decreasing (Figure 2). This is an alarming trend, which indicates that the Perm region lags behind other, more dynamically developing regions of Russia. This is especially noticeable in the performance of enterprises focused on external tourists – hotels and sanatoriums. In our opinion, among the reasons why there is a decrease in the performance of hotel and sanatorium enterprises,

there is a decrease in the quality of services provided. Taking into account the complexity of the tourist product and the variety of factors in the formation of impressions from staying in a tourist destination, a component analysis of the perception of tourism and recreational space becomes relevant.

Tab. 2. Component analysis of reviews of tourists and recreants

Components of tourism and recreational space	Sentiment index	Taxonomy Tool: Keywords (significance greater than 5)	Sentiment Analysis Tool: Key Issues
Accommodation	3,4	Room, breakfast, city center, staff, restaurant, parking, renovation	Lack of air conditioning, repairs on the floor, poor sound insulation, expensive, poor breakfast, problems with water
Entertainment	8,1	Theatre, cave, monument, museum, performance, tour, gallery, bear	Lines, trash, graffiti, boring programs
Nutrition	12,1	Dish, service, cuisine, menu, interior, atmosphere, serving	Price, taste of food, long service, quality of service
Tourism product	25,4	Excursion, trip, history, hike, mountain, nature, river, rafting, snow	Weather, food, road, garbage, toilets
Transport	1,9	Waiting room, cafe, check-in area, toilet, staff, parking, boarding gate	Parking and ramp at the railway station, prices at the airport, few departures, queues, toilet and smell
Territory	not evaluated		
Overall	5,1		

In the course of studying the perception of the tourism and recreational space of the Perm region, 5,668 tourist reviews were analysed, keywords for each component of the space were identified, the sentiment index was calculated, and key problems of its development were identified (Table 2).

Component Analysis of the Perception of Tourism and Recreational Space

An analysis of feedback on the components of the tourism and recreational space allows us to identify the most problematic sectors that are negatively perceived by tourists and hinder a positive decision to visit the Perm region.

The lowest values of the sentiment index are typical for the assessment of transport infrastructure. Until 2019, a large number of negative reviews were left in relation to the Bolshoe Savinovo airport. The old airport did not correspond to a million-plus city. Visitors complained about its small size, outdated interior, queues at the terminals. In 2019,

a new airport was put into operation and the number of complaints about the airport dropped sharply. However, another “gateway” to Perm needs reconstruction. So, a large number of negative reviews are typical for the railway station. In its current form, the station causes a large number of negative emotions among travellers in terms of the quality of service, convenience, and accessible environment. In addition, the main building of the station is located on an elevation and getting into it is a big problem for passengers with limited mobility. A fairly large number of negative reviews are left by tourists traveling on cruise ships along the Kama River. Cruise liners are physically and morally obsolete, the quality of services, the range of entertainment programs in comparison with prices also cause dissatisfaction.

Reviews left in relation to hotels have a higher value, as they reflect the opinion of foreigners and residents from other regions of Russia. There are 312 hotels and similar accommodation facilities in the Perm region, most of which are located in the regional centre. Only three hotels in the Perm region are classified as five-star, 11 hotels are four-star, 28 have three stars, 11 hotels have two stars. More than 70% of hotels do not have a star rating. In many ways, this explains the large number of negative reviews from hotel guests. Guests are not satisfied with the quality of the room stock, outdated interiors and equipment, poor sound insulation, poor breakfasts.

Museums, theatres, attractions and cultural sites, nature and parks, water parks and amusement parks were classified as “entertainment”. This category receives a large number of reviews, as many objects belong to the tourist dominants of the region and constitute the main goal for travellers. In general, guests of the Perm region positively assess the objects themselves, high-lighting the Kungur Ice Cave, the Kama River, the Museum of Perm Antiquities, the Perm Art Gallery, the Perm Opera and Ballet Theatre, sculptures and monuments of Perm. But, the general positive perception is violated by the background components of the space – shabby and vandal-painted facades, garbage on the streets, queues in the theatre and museums.

Catering is a basic service that is part of the tourism product. As a rule, the assessment of the quality of catering is subjective and often depends on the emotional state of the client, his travel experience. At the same time, it is extremely important to take into account the impression of food. When visiting the Perm region, traditional Komi-Permyak dishes (dishes from pistiks, gouts, kundums, pastries with berries) and Russian cuisine (posikunchiki) are in special demand among guests.



Fig. 3. Keyword cloud and example of recall in relation to territory (compiled by the authors)

The tourist product in the Perm region is sold by 61 organizations. Most of the tourist products in the Perm region are based on the Kungur Ice Cave, river rafting, river cruises, ski and health tourism. Tourists highly appreciate the history, the quality of excursion programs, trips along the rivers (Figure 3).

The main problems are manifested in the implementation of tourist service programs in the natural environment – long and uncomfortable journeys to the beginning of the tourist route, unequipped parking, the presence of garbage dumps. A large number of blood-sucking insects in the summer is also negatively perceived.

Geographical Analysis of Territorial Features of the Perception of Tourism and Recreational Space

At first glance, it becomes obvious a huge number of tourists from Moscow and St. Petersburg, just over 50%. This is not surprising given the population of these cities and the level of prosperity. The geographic location of the Perm Territory also plays a role. From the central part of Russia, tourists prefer to visit the capital cities or go abroad, and for the cities of Siberia it is quite expensive and far away. As proof, there are no direct flights from many Siberian cities to Perm and the only way to fly is through a transfer. Also, many residents of nearby cities of Moscow, such as Mytishchi, Podolsk, Khimki, note that they are from Moscow. This became clear through a selective detailed analysis of reviews. According to the same scheme, residents of the Perm region mark the place of residence of the city of Perm.

From Table 3, according to the main indicator, the sentiment index, it becomes obvious the geographical difference in the assessments of tourism services. For example, higher ratings are left by residents of the Perm region, for whom the main objects of visit are cultural

and catering facilities. This can be explained by the lack of similar facilities in their hometown, such as a theatre, a zoo, or a qualitatively better service. Such differences in tourist facilities between the regional capital and other settlements are quite common for Russian regions.

Tab. 3. Geographical analysis of reviews of tourists and recreants (target groups)

Tourists and vacationers	Sentiment index	Taxonomy Tool: Keywords (significance greater than 5)	Sentiment Analysis Tool: Key Issues	Tourist objects
From Moscow and Saint Petersburg	5,0	Room, city centre, breakfast, picnics, staff, theatre, cave	Small room, poor breakfast, no air conditioning, long service, uncomfortable bed	White Mountain, Kungur Ice Cave, Kama River, Museum of Perm Antiquities, Perm Art Gallery, Perm Opera and Ballet Theater
From Perm	8,7	City centre, restaurant, performance, monument, museum, embankment	Zoo, embankment, theatre, cafe service	Perm Art Gallery, Perm Opera and Ballet Theatre, Kama River, Kungur Ice Cave
Residents of the regions of the RF	5,3	Room, city centre, cave, tour, museum	Room, breakfast, air conditioning, no teapot, long service	Kungur ice cave, Kama river
Foreigners	7,2	Breakfast, staff, service, bear	Room condition, smells, furniture, communication	Museum of Perm Antiquities, Perm Art Gallery, Perm Opera and Ballet Theatre

On the other hand, foreigners visiting the Perm region have corresponding expectations from the service and often below reality. This can be explained by the following facts. Firstly, foreign tourists in the Perm region are not random guests and, as usual, they are quite experienced and prepared. Secondly, the majority visit Perm as one of the points of the Trans-Siberian Railway, that is, Perm is not the first Russian city for them. And also, foreigners can afford a more expensive service than Russian tourists, while not considering it expensive. Let's try to justify the lower assessment of residents of capital cities and other regions of the Russian Federation (Figure 4).

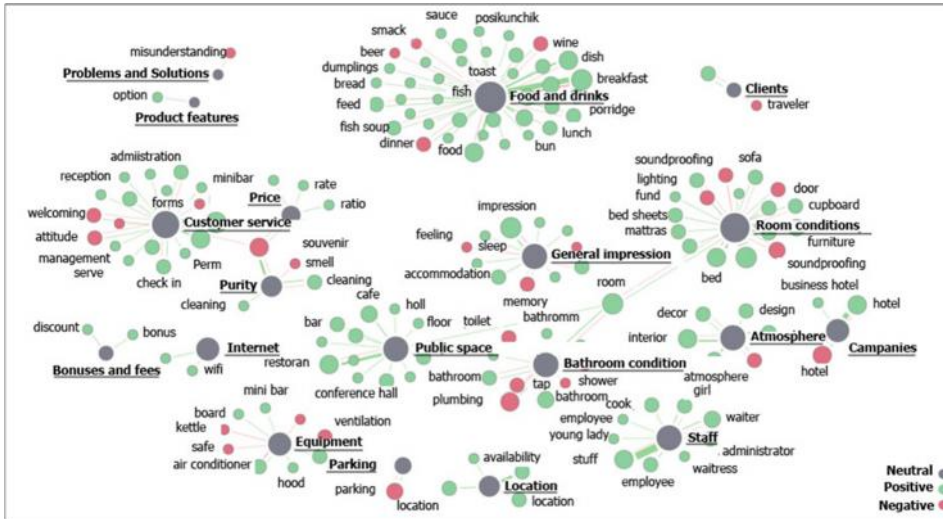


Fig. 4. Sentiment analysis in relation to objects of collective accommodation facilities (graph, red lines show the predominance of negative reviews, green - positive)

A new wave of residents of the two biggest cities and from other regions began to arrive in the Perm region after the pandemic. Tourists who are accustomed to vacations abroad, having met the Russian reality, are shocked. The quality and price are not competitive compared to the usual for Russians mass recreation areas. The expectations of dwellers from Moscow and St Petersburg are not justified even in comparison with their cities.

This situation is exacerbated in the post-COVID period, given the unpreparedness of the regions for such an influx of tourists. The above becomes clear from the key concerns left in the reviews (4th column). At the same time, it can be noted that all groups of tourists rush to visit the same tourist sites, which suggests either a lack of a large number of attractants or the hegemony of several. Based on practical experience, we tend to assert the latter.

The main danger is that when the borders open, tourists from Russian cities and regions would no longer want to return to the Perm region.

Consider from table 4 reviews of the most popular touristic cities in the region. Kungur certainly ranks first in the totality index. The reasons for the high rating lie on the surface. The history of this city is older than Perm, preserved authentic buildings of the pre-revolutionary era, a world-class tourist site – the Kungur Ice Cave and the Balloon Festival.

Interestingly, in the city of Perm, infrastructural problems are indicated as key problems. Among other things, it should be noted the problem with the old airport. Since 2018, a new one has been built and negative reviews have greatly decreased.

Tab. 4. Geographical analysis of reviews of tourists and recreants (cities)

Tourists and vacationers	Sentiment index	Taxonomy Tool: Keywords (significance greater than 5)	Sentiment Analysis Tool: Key Issues	Tourist objects
Perm	5,0	hotel, city center, theatre, restaurant, monument, museum	room, breakfast, air conditioning, airport, water	Kama River, Kungur Ice Cave, Perm Art Gallery, Opera and Ballet Theater
Kungur	6,0	cave, excursion, history, ice, balloon, merchant	boring cave, hotel Stalagmite	Kungur Ice Cave, Sylva River, Museum of Merchants, Stone Museum
Solikamsk	4,9	church, salt, museum, merchant	road, house facades, catering	Usolka River, Solikamsk Museum of Local Lore, Salt Museum
Gubakha	3,8	track, mountain, complex, skiing, snow, cafe	lifts, queue, hotels, windy weather	Krestovaya mountain, Gubakha Center

Gubakha is a traditional single-industry town (monotone). The main enterprise Metafrax and Gubakhinsky Coke have a negative impact on the environment, despite the harm reduction measures, it cannot be emphasised completely. The main motive for tourists to visit Gubakha is the ski complex built back in the Soviet era. Over the past decades, large investments have made it possible for the complex to re-assert itself. Despite this, the city did not turn into a tourist area immediately, but is moving in that direction. This is evidenced by the emergence of new hotels, catering facilities and the use of tourism potential.

Change in the Perception of Tourism and Recreational Space Over Time

Tourism and recreational space are not static. Its structure, connections are changing, and its perception by tourists is also changing. The above component and geographic textual analysis of the reviews of tourists and recreants made it possible to identify key problems in the development of individual components of the tourism and recreational space. An analysis of the change in the sentiment index over time provides information about the emerging trend of its development (Figure 5).

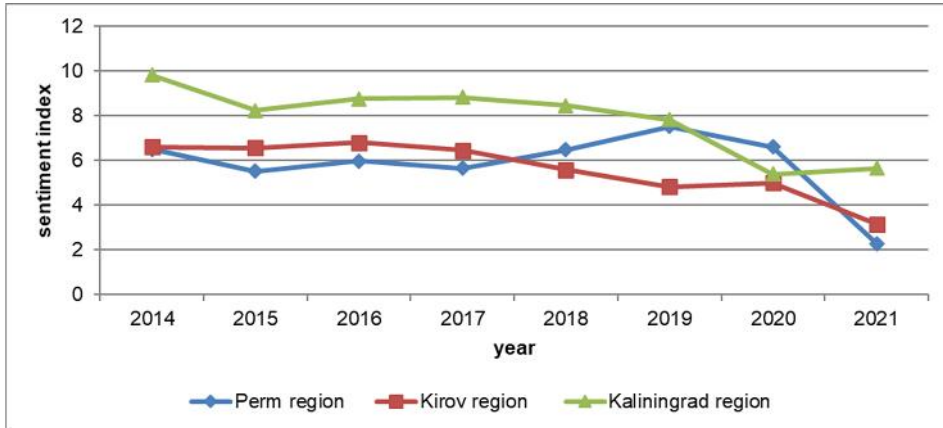


Fig. 5. Change in the sentiment index of perception of the tourism and recreational space of the Perm, Kirov and Kaliningrad regions (compiled by the author)

Analysing the data for 8 years, we can conclude that over the course of 6 years there was a slight increase in the sentiment index. In 2019, there were 7.5 positive reviews per negative review. In 2020 and 2021, the perception of the tourism and recreational space of the Perm region was negatively affected by the COVID-19 pandemic. The pandemic, on the one hand, led to the need for austerity at enterprises, which affected the quality of service, and on the other hand, due to restrictions on international travel, tourists with a high level of expectations from tourist services came to the Perm region to rest. Together with a number of other factors, this led to the fact that, by the end of 2021, every second tourist left the Perm region with negative emotions.

Discussion

The perception of tourism and recreational space must be studied using system-structural and geographical approaches, borrowing text analysis tools from other sciences. The use of text analysis methods is quite widespread in foreign studies of the tourism and recreational sphere. In Russia, a comprehensive textual analysis of the tourism and recreational space has not been carried out. These studies are frontier in nature and are relevant in the modern information society.

A component and geographical analysis of tourist reviews was carried out using the PolyAnalyst platform. The base for analysis consisted of 5668 reviews left after the interaction of tourists and recreants with the components of the tourism and recreational space of the Perm region in the period from 2014 to 2021. The reviews contain an emotional assessment of the most significant components for recreation and tourism: accommodation, food, entertainment, transportation, and tourism and excursion programs. The index of tonality, keywords and key problems of the components of the tourism and recreational space were determined.

Each component has a unique set of significant key aspects that are most often mentioned in reviews. Paying attention to these components in the formation of a tourist product or recreation programs, it is possible to achieve a more positive perception of the tourism and recreational space of the region. Key issues were identified using the Sentiment

Analysis tool. The frequency of the negative context was assessed when mentioning the components of the tourism and recreational space.

Key problems are both local and regional in nature. At the level of organization of the tourism and recreational complex, many problems are being solved within a few years – a major maintenance carried out, equipment is being updated, and the quality of personnel work is improving. The solution of regional problems is hampered by the need to incur higher costs and the peculiarities of the budget policy.

A pronounced problem area of the tourism and recreational space of the Perm region is the organization of passenger transportation. After the opening of the new terminal of Perm International Airport in 2017, the number of negative reviews began to decrease. However, the second stage of the reconstruction was delayed, so it has not yet been possible to completely solve the problems of servicing air passengers. The building of the railway station requires large-scale reconstruction, the current state of which is negatively assessed by tourists arriving in Perm.

Geographical analysis of the reviews of tourists and recreants was carried out in two directions. Firstly, the perception of the tourism and recreational space of four different target groups, identified by place of residence, was assessed. Accounting for differences in the perception of space components allows to optimize tourism service programs for a specific target group. Secondly, the territorial features of the perception of the tourism and recreational space of the cities of the Perm region were revealed. Only a city with a developed tourist function, and the presence of a world-class tourist site – Kungur, leaves a positive impression on visitors. Estimates of the regional centre suffer due to the negative assessment of the transport infrastructure.

In other cities, the share of negative reviews is even higher, which is a consequence of the underdevelopment of the tourist infrastructure, obvious problems with the improvement of the territory, and not high comfort during long journeys. A large number of negative reviews scare off potential travellers, impede the development of tourism, reducing the effects of local initiatives in the development of a tourism and recreational complex. It should be noted that a negative image can be more persistent and it is impossible to correct it only by eliminating the problem in real space.

An analysis of the change in the sentiment index revealed the negative impact of the COVID-19 pandemic on the ratio of positive and negative reviews. The share of negative reviews increased sharply in 2021, when tourist flows began to recover after initial restrictions. In conditions of closed external borders, residents of the Perm region and other regions of Russia began to travel more within the country. At the same time, having a rich experience of foreign trips, they project it onto Russian reality, expecting high standards of service. On the other hand, many tourism and recreational service enterprises, trying to survive under lockdown conditions, have significantly optimized their own costs, including at the expense of quality.

Thus, the geographical and component analysis of the perception of the tourism and recreational space made it possible to identify key regional problems, identify a negative trend in the deterioration of the sentiment index, and assess the state of individual components of the tourism and recreational complex. The results obtained should be taken into account by regional authorities when developing strategic documents for territorial planning and management of the tourism sector. In the future, the method of text analysis of

the reviews of tourists and recreants can be adapted to the solution of practical problems of individual tourism and recreational enterprises.

Conclusions

The work assessed the perception of the tourism and recreational space of the Perm region by the method of text analysis of the reviews of tourists and recreants. Textual data analysis is a new method for studying geographic phenomena and processes and shows good results when using an integrated approach. Having carried out a component and geographical analysis of the perception of the tourism and recreational space of the Perm region, one can confirm the conclusion about the heterogeneity of its structure. Heterogeneity is expressed both in the functional and in the spatial plane.

By analysing 5,668 reviews, problems were identified in the development of the basic components of the tourism and recreational space – transport and accommodation. Also, the assumption about differences in the perception of cities with different levels of formation of the tourist function was confirmed. Visitors leave the highest ratings in the cities of Perm and Kungur. In addition, a dependence was found in the perception of the components of the tourism and recreational space, depending on visitor's place of residence. Travelers from Moscow, St. Petersburg and other regions of the Russian Federation are more critical about the services provided than residents of the Perm region and foreigners.

By analysing the change in the sentiment index over time, a negative trend of deterioration in the perception of the tourism and recreational space of the Perm region was revealed. The largest share of negative reviews is typical for 2021, which can be explained by the consequences of the COVID-19 pandemic. We assume that in the future, the share of negative reviews will increase, as restrictions on the work of organizations will remain for several years. The hypothesis that the growth of negative reviews affects the performance of the tourism and recreational complex of the Perm region requires additional evidence on the example of studying other regions of Russia.

Conflicts of Interest: The authors declare no conflict of interest.

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