Impact of the activities of tour operators destabilizing changes in tourist destinations and ecotourism as a factor to minimize them

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Abstract. The article discusses the issues of incorporating external risk factors into the detail of tour operators. The purpose of the article is to investigate the redistribution of tourist flows under the influence of natural and man-made factors, in particular, plane crashes, terrorist attacks, political events, earthquakes, fires, floods, hurricanes and more. The article contains an analysis of the following aspects: transport services; services that ensure the comfort of stay of tourists outside of permanent residence (food, freedom of communication, accommodation, etc.); services that of the tourist may need while staying on a one-time of tourist the trip (treatment, entertainment, souvenirs, etc.). The author proposes a mechanism for predicting the volume of tourist flows based on the use of mathematical modeling, which will allow to take into account the scale of the crisis, its terms, development and distribution in order to improve the activities of the crisis in the event of crisis caused by natural and technological factors in one or another tourist direction and ensuring their stable functioning under conditions of destabilizing factors. It is proposed to consider ecological tourism as a factor in minimizing the negative effects of human impact on the environment and reducing man-made impact.

1 Introduction

The intensification of competition in the global market requires all its subjects to maximize the effective use of their own resource potential in a rational combination with external conditions of operation. The tourism sector, whose effectiveness of economic activity and ensuring of harmonious development are directly dependent on external cooperation, does not remain aloof. The development of the tourism business is quite important for any country in the world, because:

- Firstly, it contributes to the infrastructural development of the territories and the employment rate of the local population;

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- Secondly, it allows the use of geographical, climatic, natural and recreational resources not used in other spheres of economic activity;
- Thirdly, it provides stable both foreign exchange earnings (in the case of external tourism) and cash flows in national currency (domestic tourism) to budgets of different levels.

The development of the tourism sector depends mainly on the directions of tourist flows that are formed under the influence of demand for tourist services of a country in the world. At the same time, it should be noted that tourist demand is a rather specific phenomenon, which depends as much as possible on individual types of demand for various material goods and services, the most important of which are:

- Transport services;
- Services that ensure the comfort of stay of tourists outside of permanent residence (food, freedom of communication, accommodation, etc.);
- Services that of the tourist may need while staying on a one-time of tourist the trip (treatment, entertainment, souvenirs, etc.).

However, in our opinion, the demand for tourism services depends to a large extent not only on infrastructure factors, but also on changes in the conditions of stay of tourists outside the permanent residence under the influence of destabilizing changes in the environment.

2 Analysis of the Latest Researches and Publications

First of all, it should be noted that the tourism sector in the research of scientists is considered in most cases from the standpoint of ensuring its development and attractiveness. Thus, in the works of O. Komlichenko [1], V. Patsyuk [2], O. Chechens [3], I. Temnik [4], I. Kovtunik [5], these are some aspects of tourism development. For example, O. Komlichenko, based on the results of studies of A. Azaryan and N. Zhukov [6], L. Dyadechko [7], M. Zhukov [8], S. Tsekhla [9], proposes the author's classification of factors influencing the development of tourism sphere [1], and concludes that it is advisable to systematize and classify these factors in order to form a state policy for regulating the functioning of the tourism industry [1]. O. Chechnya's research also aims to identify and classify the factors influencing tourism. In particular, the author proposes his own classification of these factors and concludes that "... the use of the proposed classification will allow to group of the factors and reveal their impact on the industry, regulate the dynamics and direction of development of the tourism industry" [3]. V. Patsyuk considers the factors of development of tourist industry of industrial city. The author notes that "... any point and place of the globe can become an object of tourism when the stimulating factors are activated" [2], which confirms the fact of change of directions of tourist flows.

Studies by I. Temnik and I. Kovtunik are aimed at determining the factors of international tourism development. Thus, I. Temnyk emphasizes that "... for the development of international tourism in a certain country, first of all, such conditions as a favorable climate are needed; natural, historical and cultural heritage; advanced hotel and related industries; high level of security, including from international terrorism; price availability of tourist services; developed system of sports entertainment and active activity of friendly local organizations» [4]. I. Kovtunik notes that "... for the development of international tourism, the necessary conditions and a developed material and technical base are necessary" [5]. At the same time, the author emphasizes the importance of such factors as the state of the legal base of regulation of the sphere of international tourism in the country, tendencies of the business environment and development of tourist infrastructure, resource potential in ensuring the competitiveness of the national tourism industry in the global tourism market.

Instead, the study of the directions of tourist flows, the principles and methods of their formation and the factors influencing their functioning are quite small. In particular, it is advisable to highlight the works of B. Koshova [10], K. Kucherenko [11], V. Druzhinina, G. Lutsenko, and A. Ryzhak [12], I. Pisarevsky, I. Polchaninova, T. Malysheva, S. Pogasy, M. Pokolodnaya [13-14]. Thus, B. Koshova notes that "... the dynamics of tourist flows, especially the share of foreign tourists in the total volume, has been declining in recent years" [10]. However, the above trends are only related to the unsatisfactory condition of the tourist infrastructure. K. Kucherenko, exploring the impact of global risk factors on the process of forming an international tourism brand, emphasizes that "... the main issues that concern tourists in the process of determining their country of travel are those that can be attributed to the overall image of the state (cultural level, environmental situation, criminogenic situation, national and religious tolerance, political and economic stability), as well as those related to the development of tourist infrastructure (availability of recreational resources and comfort of rest, co burden of price level of service, security, travel, luggage integrity, etc.)" [11]. Later, the author concludes that the directions of tourist flows depend on the awareness of the potential tourist about the country of travel, which in most cases is formed by the influence of information in the media and the responses of other tourists, subconsciously formed stereotypes, which are not always true. In the study of V. Druzhinina, G. Lutsenko and A. Ryzhak an econometric analysis of the factors influencing the tourist flows of the region is carried out. The authors note that quantitatively tourist of flows correlate with domestic regional product, average monthly wage, number of economically active population, dollar exchange rate and consumer price index for goods and services [12].

3 Purposes and Objectives

Numerous achievements of scientists do not fully reveal the problem of redistribution of directions of tourist flows under the influence of natural and man-made factors, which is very relevant at the moment, taking into account recent events at popular world resorts.

That is why the purpose of the article is to investigate the redistribution of tourist flows under the influence of natural and man-made factors, in particular, plane crashes, terrorist attacks, political events, earthquakes, fires, floods, hurricanes and more.

4 Statement of Basic Materials

The tourism industry holds a dominant position in the economy of many countries, as it is a powerful source of financial income and has a significant synergistic effect in combination with other sectors of the national economy. In light of the increasing terrorist threats, the destabilization of the political environment, the emergence of military conflicts and the occurrence of force-majeure natural and climatic events, it is necessary to study their influence on changing directions of tourist flows, which is reflected in Tables 1-4 and in Figs. 1-3.

The problems of becoming a tourist industry of Ukraine are quite relevant today. Analyzing the factors of tourist flows, as well as the experience that Ukraine can take, the problems of ensuring the effective development of the Ukrainian tourist services is market in the context of global transformations of the tourism institute.

In the process of internationalization of economic life and the growing scale and role of international economic relations, the balance of market and state principles in the mechanism of the international market economy sector is inevitably in the interests of the former. Especially significant is this process in the tourism sphere.

Table 1.Aviation crashes.

Year	Location of the accident	Country "owner" of transport	Cause of accident	Number of casualties
2019	Ethiopia	Ethiopia (Boeing 737)	Crashes after takeoff near Bishoft (Debre Zate)	157
2018	Indonesia	Indonesia (Boeing 737 Max)	It crashed against the water strike off the west coast of Java	185
2018	Ukraine	Ukraine (McDonnell Douglas MD-83)	During the landing at the airport, it rolled out of the runway	-
2018	Cuba	Cuba (Boeing 737)	It crashed after takeoff	104
2017	Kirghizia	Turkey (Boeing-747)	Due to fog, he collapsed while approaching the post, crashing into houses near Bishkek	37
2017	USA	United States (Cessna 210)	The plane disappeared from the radar during the flight from Arizona to Colorado	4
2016	Colombia	Bolivia (Avro RJ-85)	It fell in the vicinity of Medellin due to lack of fuel. The players and employees of the Brazilian club "Shapekojense" were on board	75
2016	UAE	United Arab Emirates (Boeing-737)	Lighted up while boarding at the airport	-
2016	Egypt	Egypt (Airbus A320)	Crashed near the Greek island of Karpathos	66
2016	Russia	United Arab Emirates (Boeing-737)	Bad weather conditions. It crashed while trying to land at the airport	62
2015	Egypt	Russia (Airbus A321)	A321 disaster over the Sinai Peninsula	224
2015	Indonesia		Crashed when colliding with a mountain range	54
2015	Indonesia	Indonesia (ATR 42-30)	Technical malfunctions. It crashed after takeoff	116
2015	France	Indonesia (Hercules C-130)	Sudden loss of altitude. Crashed in the Alps in southern France	150
2015	Syria	Germany (Airbus A320)	Front-end bomber of the Su-24M Air Force of the Russian Federation, which was part of the Russian aviation group in Syria, was shot down by an air-to-air missile fired by a F-16C Turkish Air Force fighter near the Syrian-Turkish border at an altitude of about 6000 meters, the Syrian province of Latakia in the district of Baiyirbujak	1
2014	Indonesia	Russia (Su-24M Front Bomber)	Missing on the way from Surabaya to Singapore	162
2014	Niger (Sahara)	Indonesia (Airbus A320-200)		116
2014	Ukraine	Algeria (McDonnell Douglas MD-83)	Crashed in the Sahara Desert	298
2014	Indian Ocean	Malaysia (Boeing 777)	Terrorist rocket shot down by a ground-to-air class rocket at an altitude of 10,000 km in the Buk-M1 Donetsk region	239
2013	Ukraine	Malaysia (Boeing 777-200)	On the route from Kuala Lumpur to Beijing, it disappeared from the control radar	5
2012	Indonesia	Ukraine (An-24)	Torn during landing	45
2011	Indonesia	Indonesia (CASA C-212)	It disappeared from the radar and crashed	18
2011	Morocco	Morocco (Lockheed C-130 Hercules)	He crashed into Imstitan Mountain during landing	78
2011	Congo	Georgia (CRJ-100)	During landing in bad weather conditions, the plane hit the runway, split into two and caught fire	32
2010	Cuba	Cuba (ATR-72-212)	Crashed near Sancti Spiritus in the center of Cuba	68
2010	China	China (E-90)	Crashed during landing	42
2010	India	India (Boeing 737-800)	Rolled off the runway. Punching the fence, the plane broke into two parts, rolled along a forested slope and caught fire	158
2010	Libya	Ethiopia (Boeing 737)	Crew error, climb. Has experienced accidents over the Mediterranean Sea.	90

Table 2. Earthquakes, fires, floods, hurricanes.

Year	Natural disasters	Place
July, August, September 2018	Earthquakes	Indonesia: Lombok, Sulawesi and Bali
September 2018	Earthquakes	Japan: Hokkaido Island
October 2018	Earthquakes	Haiti
November 2018	Fires	California, USA
July 2018	Fires	Greece
October 2018	Floods	Italy and France: Sicily, Sardinia, France
September, October 2018	Hurricanes Michael and Florence	USA
October 2018	Flood "Leslie"	Portugal
September 2018	Jeb's Typhoons	Japan
June 2018	Fuego Volcano Eruption	Guatemala
May 2018	Kilauea Volcano Eruption	Hawaii
Summer 2018	Showers	Ukraine: Kiev, Lviv, Odessa
January 2017	Abnormal frosts	European countries (Poland, Czech Republic, Italy, Germany, Ukraine and others), Balkans, Turkey, Russian Federation
January 2017	A series of earthquakes in Italy	Montereal, Central Italy
July 2017	Forest fires in Canada	Provinces of British Columbia, Canada
July-September 2017	Flooding in Asia	India, Bangladesh, Nepal, Pakistan
August 17 - September 3, 2017	Hurricane Harvey	Guyana, Nicaragua, Honduras, Belize, Cayman Islands, Yucatan Peninsula, USA - Largest Louisiana in Texas
August 30 - September 16, 2017	Hurricane Irma	Cape Verde, St. Martin, US Virgin Islands, Cuba, Puerto Rico, Bahamas, USA - especially Florida
October, December 2017	Forest fires in California	California, USA
November 2017	Typhoon Damry	Vietnam, Hong Kong, Philippines, Cambodia, Thailand
November 29 - December 6, 2017	Otshi Cyclone	Sri Lanka, Southern India, Maldives

Table 3. Marine disasters.

Year	Marine disaster	Place
2018	Sank the ferry	Off the coast of Indonesia, the sunken steam
2018	Sank a boat with illegal migrants in the Mediterranean	Off the coast of Tunisia
2017	The ship sank	Congo
2017	Sank a boat with illegal migrants in the Mediterranean	Illegal migrants from Libya
2017	A cruise ship sank near Mykonos Island	Greece
2012	The collapse of the Costa Concordia cruise ship	in the Tyrrhenian Sea near the Italian island of Giglio

Table 4. Terrorism.

Date	What happened	Where	Killed
April 15, 2013	In Boston, during the annual marathon, two explosions occurred near the finish line	USA	3 dead, over 280 injured
April 2, 2015	In the Kenyan city of Harris, terrorists attacked a university where mostly Christians were killed	Kenya	147 people were killed,
July 17, 2014	In the territory of Donetsk region occupied by pro-Russian fighters, a passenger Boeing 777 was shot down, flying from Amsterdam to Kuala Lumpur	Ukraine	80 were injured
June 26, 2015	Terrorists attack hotel beach in Port El Kantaoui, a suburb of Sousse resort, where they started shooting at tourists from two hotels	Tunisia	283 passengers and 15 crew members
January 7, 2015	Attack on the editorial board of Cherlie Hebdo	France	40
March 18, 2015	Attack on tourists	Tunisia	12
March 20, 2015	The explosion in the Badr mosque	Yemen	23
June 26, 2015	Attack on a tourist hotel	Tunisia	130
October 10, 2015	Explosions in Ankara	Turkey	37
October 31, 2015	The crash of the Russian plane	Sinai Peninsula	95
November 14, 2015	A series of terrorist attacks in Paris	France	224
November 20, 2015	Attack on the hotel	Mali	140
March 13, 2016	An explosion in Ankara	Turkey	19
March 22, 2016	Explosions at Brussels Airport	Belgium	37
June 28, 2016	Explosions at Istanbul Airport	Turkey	26
July 14, 2016	A terrorist attack on the waterfront of Nice	France	41

Fig. 1. International tourist flows to Egypt.

Fig. 2. International tourist flows to Ukraine.

Fig. 3. International tourist flows to Turkey.

Tourism flows in this area have increased almost twice on average every two years. And the system of interstate regulation is not able to quickly adapt to the rapidly changing situation in the tourism sphere. Financial flows were almost out of control of national countries.

The modern world tourist system has become virtually independent of state control and regulation.

Travel flows and related currency exports are reflected negatively in the country's balance of payments and positively on the balance of the host country. According to the directions of the currency movement, for the country sending its resident abroad, the tourist expenses are import, and for the host country - export. From the static [1, 2], we see that the main balance of payments deficits are in the underdeveloped developing countries; including Ukraine. Imports of services in Ukraine (tourism expenditures) are almost three times higher than exports of services from Ukraine (revenues from international tourism) according to the WTO. Balance of payments is negative. That is, Ukraine, with its great tourist potential, is a donor country, tourist supplier to countries such as Turkey, Poland, Egypt, Croatia, Montenegro and others.

The main indicators of the study of the tourist market and its subjects should include those that adequately and promptly reflect the main changes, trends and rates of market development and are least affected by random, uncontrolled and difficult to predict factors.

As you know, the economy develops under the influence of the following factors: physical, psychological, political, economic, social origin; locally, nationally or globally; clear and not quite clear in character and expression; temporary and lasting in effect.

While exploring the main indicators of the tourism market research, you may be faced with a dilemma: on the one hand, you should use as many indicators as possible in order to have a better, detailed, adequate analysis of the situation and to identify the factors that are shaping and developing.

But on the other hand, the number of indicators selected should be minimized within a reasonable range, since it is practically impossible to find extremely voluminous information material that adequately reflects the situation in a short period of time; systematize it, analyze and identify trends and make the necessary forecast.

This is due to the fact that due to the excessive number of characteristics, it is impossible to analyze them all at the same time, that is, when the last ones are put into order - the former may change and no longer be true, so they will have to be supplemented, refined in order not to nullify all the accomplishments. work.

Thus, from a large number of possible indicators, it is necessary to select the most important ones that best reflect the influence of economic factors, that is, those characteristics that shape the current situation and will take place in the near future, namely internal and external factors influencing tourist flows.

Internal factors influencing tourist flows include the following:

- Cost of tourist services;
- Convenience of flight data (place of departure, duration of flight, airline reliability);
- Benefits in relation to the type of recreation (food system, municipal or private beaches, mountainous or deserted areas);
- Health status and climatic conditions in the chosen direction of tourist travel (seasonality in different countries);
- Presence or absence of a visa. In case of complexity and cost of paperwork;
- Political and economic situation in the chosen direction of tourist travel.

External factors influencing tourist flows are determined by events of anthropogenic-military nature, namely natural disasters, terrorist activity, aviation, maritime and other catastrophes.

Despite the realities of the country's economy, the tourism industry in Ukraine is dynamically developing. During the period 2007–2018, the development of the tourism industry was influenced by investments, which were heavily channeled into the hotel and restaurant sectors. Investments increased from UAH 469 to 4908 million, or 10.5 times [6, p. 204], although most experts, including representatives of the Ministry of Culture and Tourism of Ukraine [15], believe that the tourism infrastructure of the country is underdeveloped and morally obsolete.

It is also worth pointing out that domestic tourist flows by 71.1% were provided by inbound tourist flows and only by 28.9% by domestic tourists, and during 2007-2018 the share of domestic tourists on the market tended to decrease, may indicate a weak development of domestic tourism in Ukraine (Fig. 4).

At the same time, official statistics from different sources differ significantly, which is caused by, on the one hand, different methodological accounting bases and, on the other, by significant shadow turnover in the industry. It is impossible to determine the capacity of the tourist of flows market today.

Fig. 4. Dynamics of the structure of domestic tourist flows in Ukraine from 2007 to 2018 [15].

According to the State Service for Tourism and Resorts, the amount of consumption secured by tourist flows is about \$ 3.8 billion. Per is year (of which only \$ 1.1 billion falls on licensed market operators) [11, p. 3].

Statistics of Ukraine do not consider the tourism industry as a complex economic complex and evaluate its individual components according to the spheres of economic activity according to the NACE codes.

Statistics on tourism development in Ukraine often contain considerable controversy and controversy. According to official statistics, in 2018 the activity of sectors serving mainly tourist flows amounted to about \$ 5.4 billion. USA [15].

At the same time, the UNWTO World Tourism Organization estimated Ukraine's tourism flows in 2018 at \$ 3.8 billion. USA [14, p. 7], and the World Economic Forum estimated total tourism revenue in Ukraine in 2018 at \$ 2.2 billion. USA [11, p. 368]. According to experts from the US Agency for International Development USAID, the average foreign tourist stays in Ukraine for about 4 days, leaving about \$ 600 during this time. USA [8, p. 154], which of corresponds to revenues from tourism activities of \$ 12.7-12.8 billion. USA.

Despite the significant positive changes in the tourism sector, the significant increase in tourist flows and revenues from tourism activities, it should be noted that the dynamics of the industry in Ukraine is far behind the global trends. According to the State Statistics Service [13], in the last 10 years the dynamics of inbound tourism development in Ukraine has averaged 12.6% per year.

However, the global financial crisis has significantly affected the trend of inbound flows; in 2009 the flow of foreign tourists decreased by 18.3% according to the State Statistics Service [12] and 24% according to the Ministry of Culture and Tourism of Ukraine [12].

The reason for such negative dynamics of the Ukrainian tourism sphere is the lack of promotion of tourism products in the world market. This is evidenced by the structure of inbound tourist flows in Ukraine. In 2017-2018, 89.6% of all arriving tourists visited Ukraine for a private purpose, namely: 5.7% of tourists intended to visit tourists (Table 5).

In 2018, about 74.1% of foreign tourists came to Ukraine for leisure and recreation, which necessitates the development of appropriate tourism infrastructure.

Almost 18.4% of tourists came to Ukraine for business purposes, so it is important to improve business tourism infrastructure. On the other hand, the share of medical tourism in recent years has tended to decrease and in 2017 was only 5.8% of the total inbound tourist flow, which confirms the assumption about the negative state of the spa sphere in Ukraine (Fig. 5).

Table 5. Structure of tourist flows by purpose of visit in 2018 [15]

goal	number of people	part, %
official, business	644992	3.01
tourism	1225954	5.72
private	19180171	89.56
teaching	59169	0.28
employment	16143	0.08
immigration (permanent residence)	64796	0.3
cultural and sports exchange, religious, other	224071	1,05

Fig. 5. Structure of tourist flows by purpose of travel during 2007–2018 [15].

The development of the tourist services market depends on a sufficient number of licensed participants, the share of which remains small today. Of all the operators licensed to operate in the tourism business, in fact, only 66.0% work.

The share of licensed operators in servicing domestic tourist flows in the last decade has decreased from 26.9% in 2007 to 4.4% in 2018, which only confirms the importance of improving tourism infrastructure in Ukraine (Fig. 6).

Fig. 6. Comparison of inbound tourism flows for the period 2007-2018 [16].

In today's context, it is difficult to identify all-Ukrainian tendencies in the dynamics of domestic tourist flows in Ukraine, which can testify to the significant influence of regional features on the competitiveness of a region and the formation of tourist flows at the regional level. The development of the tourism sphere of this or that region contributes to the formation of a sustainable tourist flow. However, the increase in tourist flow raises the problem of determining the optimal environmental load for the region and the need to

determine the maximum capacity without sacrificing the environment and historical and cultural heritage. This issue is being actively discussed by scholars in the context of sustainable tourism development, the aim of which is a harmonious combination of economic activity, the conservation of natural ecosystems and the enhancement of social welfare [15, p. 106].

The planning of work in any sphere of economic activity is based on forecasting the results. Indeed, forecasting is the definition of trends and prospects for the development of certain processes, based on the analysis of their previous states [1].

Depending on the forecasting period, forecasts are divided into short-term (up to three months), medium-term (up to two-three years) and long-term (more than two-three) years.

When selecting forecasting methods, one should be aware that some of the methods require a large amount of initial data - quantitative methods, while others work in general without reliable information, based, for example, on the expertise of experts - qualitative methods.

With the fundamental difference between qualitative and quantitative forecasting methods, they are based on the same principles and assumptions, namely:

- All methods require qualitative or quantitative analysis of past periods;
- Forecasts are rarely accurate; they can only indicate the trend of development;
- The accuracy of the prediction is inversely proportional to the prediction interval (the higher the horizon, the less the accuracy);
- Forecasts for the industry, direction, and complex are generally more accurate than forecasts for individual enterprises, parameters, etc.

We need to realize that the iterative procedure for constructing a mathematical prediction model is based on:

- Identification - the use of any information on how the numerical values under study have been obtained in order to select a set of economic parameters that deserve attention;
- Evaluation - obtaining model parameters that determine its adequacy;
- Diagnostic verification - Checking the consistency of the model with the initial data.

The application of any quantitative methods requires extensive preparation: collection, analysis, statistical processing of data.

We use the concept of time trend - the main trend of changing the time series. Forecasting economic indicators based on trend models is based on extrapolation as a method of scientific forecasting [13-15].

In the context of the study problem, by extrapolation, we understand the extension of the laws that they established during the study period beyond.

The reliability of constructing long-term forecasts requires us to use, analyze, compare several methods; defining their advantages and disadvantages [14]. We will illustrate in detail the application of all selected methods.

The simple moving average method [13] is that the calculation of an indicator at a predicted point in time is based on obtaining averages of this indicator over several previous points,

$$f_k = \frac{\sum_{i=k-N}^{k-1} x_i}{N} \quad (1)$$

Here f_k – is the value of the indicator according to the forecast, x_i – previous (experimentally obtained) metric values, N – the magnitude of the smoothing interval. In the presented calculations accepted $N = 3$ and expanded the forecast horizon by using pre-calculated metrics.

The advantages of the presented method include the ease of use and the clarity of the results obtained. The significant disadvantage is the fact that with a small number of observations, the magnitude of the smoothing interval affects the shape of the trend; the initial and final elements of the series are lost.

The weighted moving average [13-15] method is based on the fact that the impact of all real indicators used in the calculations is not the same, more recent data is usually more influential. This introduces the notion of "weight" of each of the indicators: older data have less weight, more recent - more. Mathematically, this method can be described by the formula:

$$f_k = \sum_{i=1}^N \omega_{k-i} \cdot x_{k-i} \quad (2)$$

Note that the value of "weight" is always a value that is positive and satisfies the condition.

$$0 \leq \omega_k \leq 1$$

In calculations, we also take $N = 3$; $\omega_1 = 0,1$, $\omega_2 = 0,3$, $\omega_3 = 0,6$ (these weights are used most often). Note that a numerical experiment was conducted with other values of the weights. As a result, we made sure that the selected weights give the most favorable indicators. The results of the calculations are summarized in the table:

The proposed method of refinement is based on the feedback method: new forecasts are made taking into account adjustments to previous ones. When choosing weights, you also need to consider the feedback. The advantage of the method in taking into account the objective disparity of the "old" and "new" data is undoubted with a small forecast horizon (in our case - 1 year).

Trend projection method. The basic idea of this [13-15] method is to construct a line that "deviates" on average the least from the array of points set by the trend. To reflect the underlying trend, changes in metrics use any function, but most often with polynomials:

- $f_k = a_0 + a_1 \cdot t$ - polynomial of the first degree;
- $f_k = a_0 + a_1 \cdot t + a_2 \cdot t^2$ - second degree polynomial;
- $f_k = a_0 + a_1 \cdot t + a_2 \cdot t^2 + \dots + a_n \cdot t^n$ - Polynomial of the n degree.

Here $a_0, a_1, a_2, \dots$ - the parameters of the polynomials. In statistical practice, they have their own interpretation: a_0 it characterizes the average conditions for the development of a number of dynamics of a parameter, a_1 - his rate of growth (falling, at negative values), a_2 - the acceleration of growth (falling). The values of the polynomial parameters are found by the least squares method. Its essence is to determine such coefficients for which the sum of the squares of deviations of the calculated values from the actual would be minimal. Thus, these coefficients find expression minimization

$$\sum_{i=1}^N (x_i - f_i)^2 \rightarrow \min$$

Here N - number of row elements, x_i - the actual value of the parameter, f_i - calculated value. As a result of minimization, a system of normal equations is obtained:

$$\begin{cases} n \cdot a_0 + a_1 \sum_i t_i + a_2 \sum_i t_i^2 + \dots + a_n \sum_i t_i^n = \sum_i x_i \\ a_0 \sum_i t_i + a_1 \sum_i t_i^2 + a_2 \sum_i t_i^3 + \dots + a_n \sum_i t_i^{n+1} = \sum_i x_i \cdot t_i \\ a_0 \sum_i t_i^n + a_1 \sum_i t_i^{n+1} + a_2 \sum_i t_i^{n+2} + \dots + a_n \sum_i t_i^{2n} = \sum_i x_i \cdot t_i^n \end{cases} \quad (3)$$

We performed the design using a linear (1st degree polynomial) trend (Table 6, Fig. 7-9).

Table 6. Number of foreign tourists, thousand

Period	Turkey	Ukraine	Egypt
2012	35,698	23013	11196
2013	37,795	24671	9174
2014	39,811	12712	9628
2015	39,478	12428	9139
2016	30,289	13333	5258
2017	37,601	14230	8157

the number of foreign tourists in Turkey

Fig. 7. Forecast of the number of foreign tourists in Turkey.

number of foreign tourists in Ukraine

Fig. 8. Forecast of the number of foreign tourists in Ukraine.

Fig. 9. Forecast of the number of foreign tourists in Egypt.

Graphically linear trend is represented by a straight line. In this case, there are ascending, descending and lateral trends. The upward trend is described as a line of "support" and the downward trend - as a line of "resistance".

5 Conclusions

Conclusion. The tourism business is of great importance for any country in the world because of its powerful opportunities for attracting significant financial income, promoting the infrastructural development of the territories and increasing the employment of the local population, the use of free geographical, natural and climatic, recreational resources, ensuring synergistic effect within the organic combination of tourism spheres with other branches of national economies. But today tour operators feel a significant negative impact of natural and man-made factors on the formation and redistribution of tourist flows. The author analyzes the impact of aviation and maritime catastrophes, earthquakes, fires, floods, hurricanes, the effects of terrorism on tourist flows to Egypt, Turkey, and Ukraine and concludes that these events caused a significant reduction in the number of tourists arriving to tourists and redirecting tourists to the tourist destinations, countries.

The study found that the Ukrainian tourism industry is characterized by negative dynamics, and therefore, the country annually underperforms a large amount of foreign exchange financial revenues, and tour operators do not withstand competition and are forced to leave the market. In view of this, the author proposes a mechanism for predicting the volume of tourist flows based on the use of mathematical modeling, which will allow to take into account the scale of the crisis, its terms, development and distribution in order to improve the activities of the crisis in the event of crisis caused by natural and technological factors in one or another tourist direction and ensuring their stable functioning under conditions of destabilizing factors.

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