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The Link Between Economic Growth and Tourism: Covid-19 Impact

Oleksii LYULYOV
Sumy State University, Sumy, Ukraine, alex_lyulev@econ.sumdu.edu.ua

Yana US
Sumy State University, Sumy, Ukraine, y.us@fem.sumdu.edu.ua

Tetyana PIMONENKO
Sumy State University, Ukraine, tetyana_pimonenko@econ.sumdu.edu.ua

Aleksy KWILINSKI
The London Academy of Science and Business, London, United Kingdom
a.kwilinski@london-asb.co.uk

Tetyana VASYLIEVA
Sumy State University, Sumy, Ukraine, tavasilyeva@fem.sumdu.edu.ua

Nataliya DALEVSKA
Institute for International Cooperation Development, Poznan, Poland, dalevskanm@gmail.com

Jan POLCYN
Stanisław Staszic University of Applied Sciences in Pila, Pila, Poland, Jan.Polcyn@puss.pila.pl

Viktoriia BOIKO
Kherson State Agrarian and Economic University, Kherson, Ukraine, boiko.vo17@gmail.com

Abstract

This paper deals with the investigation of the relationship between tourism and economic growth. The research theoretically proved modern tourism was a wide-spread dynamic industry with high impact on economic development, damaged by COVID-19 crisis. This paper aims to analyse changes in the tourism industry to forecast recovering of tourism activity in the view of quarantine restrictions. For achieving the goals, the authors used the extrapolation model ARIMA. The object is the routs plotting requests of Apple users in Poland, Estonia, Latvia, Lithuania, Hungary and Czechia from 13 January to 9 May 2020. The forecast has been conducted under several conditions as follows: 1) without the introduction of quarantine restrictions from 11.03.2020; 2) taking into account the quarantine restrictions on movements. The findings demonstrated that the adopted quarantine measures have a significant impact on overcoming the recession in the tourism industry in conditions of economic, social and political tension. Herewith, there is a slight positive tendency in recovering tourism. The results provide background for future researchers on developing a strategy to overcome the tourism recession.

Keywords: COVID-19, Domestic Tourism, Economic Growth, Pandemic, Tourism.

Introduction

The globalisation process with expanding the political, economic, scientific and culture communications is the main trigger for tourism industry development. In turn, the tourism activity allows getting to know better the historical-cultural heritage almost of any country, engage in the customs and traditions of different nations and expand their worldview. Consequently, tourism could be associated with rest, pleasure and new impressions for most of the people.

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However, tourism is one of the most profitable and dynamic economic industry. The tourism impact enlarges upon the key economic sectors as follows: the production of consumer goods, trade, building, transport and communication, agriculture, etc. Thus, it is a useful tool to improve the economic development of any country or territory due to the increasing the GDP; engaging additional currency; providing additional workplaces involved in the hotel and restaurant complex, transport industry and related industries; developing the related industries; the growth of revenue from taxes into the budgets of all levels; etc. (Pimonenko, et al., 2019; Lyulov, et al., 2018).

Notably, the border openness of countries has increased. In turn, the tourism freedom of Ukrainians estimated by the Henley Passport Index showed a positive tendency (Figure 1). It worth noting on 17 May 2017 the EU and Ukraine signed the agreement on visa-free regime. Herewith, Ukrainians may travel to EU countries with tourism or business goal to 90 days without a visa. Consequently, the number of countries not demanding the visa from Ukrainians increased in 1,56 times. Upon that, since the second quarter of 2020, the Ukrainians may travel to 129 countries without the visa. However, among the analysed countries which have a similar Soviet Union past, the leader is Lithuania while the Lithuanians are free to visit 181 countries as of 2020. Notably that in 2017 more than 14 million foreign tourists visited Ukraine, while the average income from which was 526,5 USD per entrance. Herewith, the tourism industry generated 1.4% of GDP, while provided 1.3% workplaces.

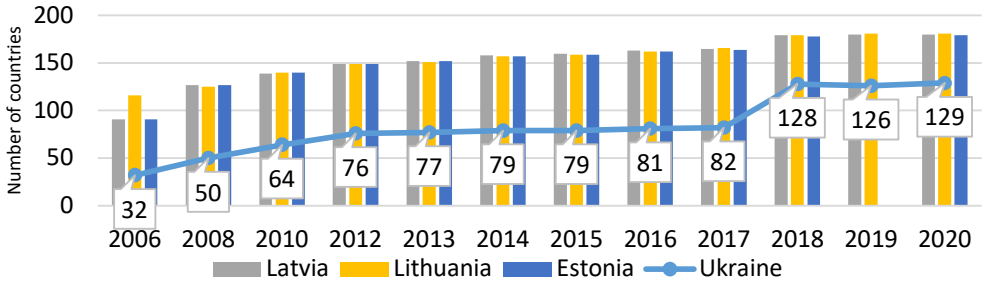

Fig. 1: The Dynamic of the Henley Passport Index of Latvia, Lithuania, Estonia and Ukraine (2006-2020) (created by the authors based on (Henley, 2020)

According to the Travel & Tourism Competitiveness Index, which reflects the competitiveness of a country's tourism industry by criteria such as business environment, protection and safety, health and hygiene, human resources and labour market, environmental status and others, Ukraine ranked 78th out of 140 in 2019 (Table 1). It should note that compared to 2017, Ukraine rose in the ranking by 10 positions.

At the same time, the competitiveness of Ukraine's tourism industry is lower by 3.2% compared to the global average, while in the EU the competitiveness is higher: in Estonia - by 9.1%, in Latvia - by 5%, in Lithuania - by 3.3%. In turn, the constant leader in this ranking is Spain, whose competitiveness in the tourism sector is higher by 41.4% compared to the global average.

The analysis of the experience of developed countries in tourism indicated that the geographical location of the region, the natural resources, climate conditions as well as the rich historical and cultural heritage are the main factors to attract the tourists. However, the demand generation on tourism services depends on some other factors that could increase or decrease the level of demand (Lyulov & Pimonenko, 2017; Letunovska, et al., 2017):

- economy-wide – the level of material welfare of consumers, developing the programs of improving the tourism industry, engaging the investments, correlation between the working and free time of employees, etc.;
- social and demographical – age, gender, education, profession, social status, condition of marriage, financial situation, residence, etc.;
- cultural and socio-psychological – the psychology of consumption, the priorities in the system of spiritual values, religion, etc.;
- personalised and behavioural – lifestyle, targets, personal characteristics, temperament, preferences, motives, etc.

Table 1: Travel & Tourism Competitiveness Index in 2019
(created by the authors based on (World, 2019))

Country	Rating position	Score	Absolute growth compared to 2017		Absolute growth compared to the global average rate, %
			rating position	score (%)	
Spain	1	5.4	0	0.3	41.4
USA	5	5.3	1	2.6	36.6
Italy	8	5.1	0	1.9	32.2
China	13	4.9	2	3.2	27.2
Thailand	31	4.5	3	2.6	16.9
Turkey	43	4.2	1	2	9.8
Estonia	46	4.2	-9	-7	9.1
Latvia	53	4	1	1.8	5
Lithuania	59	4	-3	1.5	3.3
Egypt	65	3.9	9	7	1.3
Marocco	66	3.9	-1	2.2	1.2
Ukraine	**78**	**3.7**	**10**	**6.5**	**-3.2**

According to the mentioned above, the tourism industry provides a particular region with cash inflows from tourists and increases the turnover of commodities and workplaces. In turn, for developing the tourism industry, it is necessary to implement the following: to provide cooperation between the tourism agencies and regional authority for popularising the region widely; to engage all participants of small business for developing common tourism concept coordinated by the regional authority; to focus on the inhabitants of close big cities and tourists in one day trip or vacation.

Literature Review

The investigation of the tourism impact on economic development is a goal of the significant number of scientific publications. Furthermore, tourism issues concern experts from the different professional field such as marketing, management, culture, medicine, ecology, etc. In turn, the systematisation of scientific publications on the link between economic growth and tourism demonstrates a positive tendency of publication activity. In the frame of this article, 1698 publications indexed by the Scopus database were analysed. The search was conducted by the keywords "economic growth" and "tourism" in the title, abstracts and keywords of publication. The limitation criterion was published articles in the period from 2000 to 2020.

According to Figure 2, the number of scientific publications in investigating the economic growth and tourism relationship presented in the Scopus database increased by more than 21 times in 2019 related to 2000. Moreover, the most massive part of documents was published by scientists from the USA (12%), China (11%), Great Britain (7%) and Malasia (7%). It worth noting than the link between tourism and economic growth is investigated in different subject areas as following in the field of social science (28%), Business, Management and Accounting (24.3%), Ecology (11%), Economics, Econometrics and Finance (9.7%), etc.

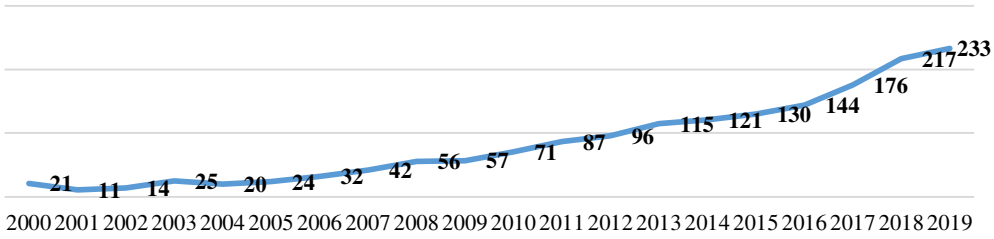

Fig. 2: The Dynamic of Publication Activity on the Link between Tourism and Economic Growth
(created by the authors using Scopus tools)

To deeper investigate the thematic directions of analysed publications, the bibliometric analysis was conducted using the VOSviewer tool. It worth noting that this tool allows building the network map on the base of the keywords co-

occurrences in the investigated publications. Moreover, it visualises the co-occurrence links with other keywords and calculates the total strength between them(Us, et al., 2020). Thus, set a limitation criterion minimum 5 of occurrences of keywords and excluding the irrelevant keywords, the network map was built with 249 items grouped in the clusters (Figure 3). In turn, the network map of keyword demonstrates different combination variants of the keywords as inside, so outside the cluster. It worth noting that different colours highlighted the specific cluster. Furthermore, the size of circles indicates the frequency of appearing the keyword in the scientific documents. Then, the bigger the diameter of the circle is, the more frequent the keyword is used. Herewith, the distance between circles indicates the link strength between two items.

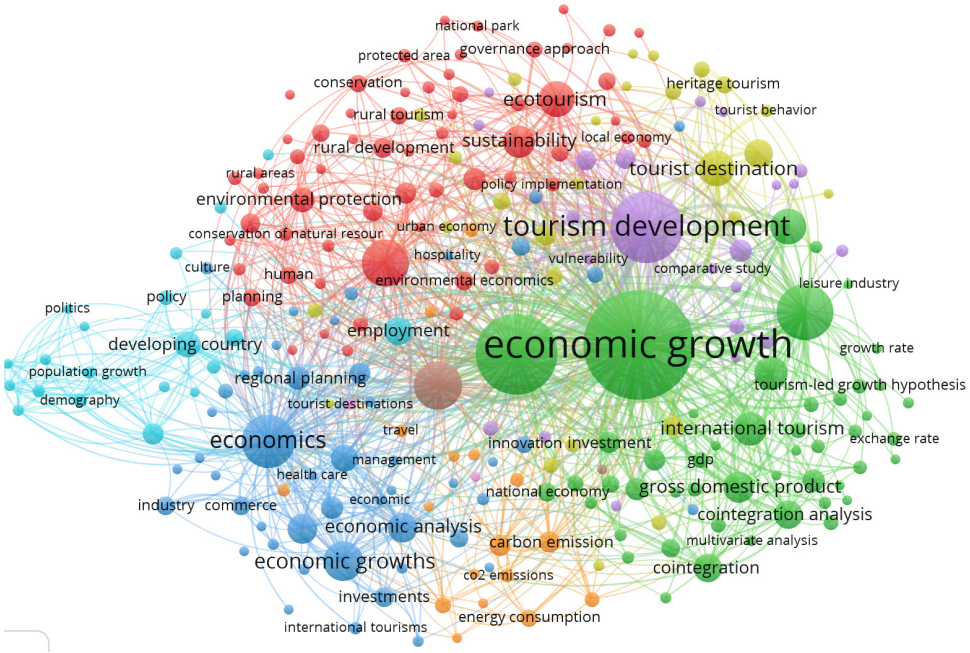

Fig. 3:The Network Map of the Theme Directions of Scientific Publications on Link between Tourism and Economic Growth (created by the authors using VOSviewer tool)

Following Figure 3, the network map consists of 9 clusters, which combine the investigate keywords on thematic closeness. Herewith, the most significant red cluster (61 items) is directed on research in the relationship between tourism and environmental issues. In turn, the green cluster (49 items) is intended to investigate the link between economic growth and tourism development. Then, the blue cluster (48 items) aimed at research on economic development, tourism and climate change.

In turn, the most articles on investigating the link between tourism and economic growth were published in scientific journal sa follows *Tourism Economics (Q1), Tourism Management (Q1), African Journal Of Hospitality Tourism And Leisure (Q3), Current Issues In Tourism (Q1), Journal Of Sustainable Tourism (Q1), Journal Of Travel Research (Q1), Tourism Analysis (Q2),* etc.

In turn, the summarisation of literature resources allowed selecting the significant number of scientific publications which are one of fundamental for tourism development. In turn, (Kmeco et al., 2019; Krajcik et al., 2019; Tyelyetov et al., 2012) dedicated to the investigations of the economic essence of tourism. While analysis of the tourism industry impact during the longterm period is researched in work (Tovmasyan, 2019). It worth noting, in the articles (Kljucnikov, et al., 2020; Lee, et al., 2013; Preechawong, et al., 2019; Lyulyov & Shvindina, 2017) the authors indicated in the linear relationship between economic growth and tourism development. Furthermore, in the frame of the articles (Chygryn et al., 2020; Bogachov et al., 2020; Dalevska et al., 2019; Dementyev & Kwilinski, 2020; Tkachenko et al., 2019a; 2019e; Boiko et al., 2019; Kuzior et al., 2019; Kwilinski et al., 2020a; 2020b; 2020c; Lakhno et al., 2018; Kharazishvili et al., 2020; Kondratenko et al., 2020; Dzwigol. 2019a; 2019b; 2020a; 2020b; Pająk et al., 2016; 2017; Dzwigol & Wolniak, 2018; Dzwigol & Dzwigol-Barosz, 2018; 2020; Ponomarenko 2018a; 2018b; 2018c; 2019; Dzwigol et al., 2019a; 2019b; 2019c; 2019d; 2020; Prokopenko et al., 2015; 2018; 2019a; 2019b; Kwilinski et al., 2020a; 2020b; Miśkiewicz, 2018; 2019; 2020a; 2020b; Miskiewicz & Wolniak, 2020; Bilan et al., 2019a, 2019b) the authors investigate the longterm relationship between tourism, digital economy, CO2, the foreign direct investments and economic growth. In particular, the researchers noted that the state of the tourism industry, the

foreign direct investments and CO2 level have a positive impact on the economic development, while the tourism and foreign direct investments negatively influence on the level of CO2. The authors in the papers (Czyżewski et al., 2019; Furmaniak et a., 2018; 2019a; 2019b; Kwilinski, 2018a; 2018b; 2019; Kwilinski et al., 2019a; 2019b; 2019c; 2019d; 2019e; 2019f; 2019g; Kwilinski & Kuzior 2020; Prokopenko, O., & Miskiewicz; Tkachenko et al., 2019b; 2019c; 2019d; Saługa et al., 2020; Savchenko, 2019) analysed the impact of industrial companies development on economic development and tourism in the region. The researchers Shubert S., Brida J., Ricco V. in the publication (Schubert, et al., 2011) noted that increasing the demand for tourism services lead to the improving of the economic situation and expanding the partnership between countries. The special attention is paid to investigating the state and opportunities of the Ukrainian tourism industry as well as its influence on the economic development in work (Teletov et al., 2012).

Table 2: The Systematisation of Studies on Modelling in Tourism

Studies	Region	Methods for modelling and forecasting	Topic of research
Song, et al., 2010	Hong Kong	ADLM (Autoregressive Distributed Lag Model)	Exploring the influence of the global financial crisis on tourism demand.
Tsui & Balli, 2017	Australia	The Box- Jenkins SARIMA, SARIMAX and SARIMAX/EGARCH volatility models	Forecasting the foreign passenger entries in the perspective of marketing expenditure.
Song, et al., 2011	Hong Kong	STSM (the structural time series model)	Modelling the development of tourism visitors depending on various factors.
Zortuk, 2009	Turkey	VECM (Vector Error Correction Model)	Examining the link between economic growth and sharp tourism development.
Srinivasan, et al., 2012	Sri Lanka	ARDL (the Autoregressive Distributed Lag)	Estimating the tourism influence on the development of the economy.
Malik, et al., 2010	Pakistan	Johansen cointegration technique and ECM (error correction model)	Testing the connection between tourism development and GDP increase.
Li, et al., 2005	Generally	TVP (the time-varying parameter model)and structural time-series model	Analysing the current developments in econometric models and approaches to discover the best one.
Li, et al., 2006	United Kingdom	TVP-ECM (error correction models and time-varying parameter)	Modelling tourism demand focusing on spending per tourist.
Kulendran & Dwyer, 2012	Australia	BSM (the Basin Structural Model)	Modelling the seasonal number of visitors in tourism depending on climate issues.
Kulendran & Shan, 2002	China	The naïve "No Change" model	Modelling the tourism demand in the view of Chinese "open door policy".

The systematisation of scientific publications in tourism modelling (Table 2) allowed noting many different econometric models, approaches and techniques used in tourism development forecast. Moreover, the theoretical results allowed to assume there was no single overperformed model to use for forecasting in tourism. In the frame of this article, the ARIMA(*p, d, q*) model was used to make the forecast of tourism recovering from COVID-19 in the view of two scenarios of development.

Methodology

In the frame of this article, the integrate autoregressive model ARIMA(p,d,q) was used to analyse the changes in the tourism industry and develop the short-term forecasts of tourism activity in consideration of the influence of quarantine restrictions. Notably, this model allows accurately reflecting the impact of COVID-19 on the tourism industry on the base of which it is possible to develop the strategy of tourism recovering. Thus, it worth noting, that ARIMA(p,d,q) model is a class of statistical models used to analyse and forecast time series data. Based on the paper (Krukov & Chernyagin, 2011), the ARIMA(p,d,q) model has the following form:

$$(\Delta^d X_t) = \sum_{i=1}^{p} \varphi_i \, (\Delta^d X_{t-1}) + \varepsilon_t + \sum_{j=1}^{q} \theta_j (\Delta^d \varepsilon_{t-j}) \, , \varepsilon_t \sim N(0, \sigma_t^2) \quad (1)$$

The short form of the ARIMA(*p,d,q*) model is:

$$\varphi(B)(1-B)^d X_t = \theta(B)\varepsilon_t \quad (2)$$

where $\varphi(\bullet)$, $\theta(\bullet)$ – polynomials of degree p and q,
B – lag operator ($B^j X_t = X_{t-j}, B^j \varepsilon_{t-j}, j = 0, \pm 1, ...$),
d – sequential difference order ($\Delta X_t = X_{t-1} - X_t = (1-B)X_t, \Delta^2 X_t = \Delta^2 X_{t+1} - \Delta X_t = (1-B)^2 X_t, ...$).

It worth noting that at the first time the systematic approach to developing ARIMA(p,d,q) model was presented by George Box and Gwilym Jenkins in 1976 (Ma, et al., 2018). Given that, the methodology of developing the ARIMA model consists of several main steps as follows:

1. Model identification that best suits the actual process under consideration.

On the base of calculated estimates for the autocorrelation and partial autocorrelation functions, the preliminary conclusion on the integration order d and the order values of the autoregression operators and the moving average p and q is done.

The primary model describing the stationary process is the autoregressive model with p-order. In turn, the autoregressive process means the dependence on the current level from the previous ones. The autoregression model (AR) p-order is expressed as

$$Y_t = \varphi_0 + \varphi_1 Y_{t-1} + \varphi_2 Y_{t-2} + \ldots + \varphi_p Y_{t-p} + \varepsilon_t, \quad (3)$$

where Y_t – level of time series at the time point t (dependent variable);
$Y_{t-1}, Y_{t-2}, \ldots, Y_{t-p}$ – the levels of time series at the time points $t-1, t-2, \ldots, t$ – respectively (independent variables);
$\varphi_0, \varphi_1, \varphi_2, \ldots, \varphi_p$ – estimated coefficients;
ε_t – random walks describing the variable impacts unaccounted for the model (3).

The moving average (MA) model is a linear regression of the predicted time series value relative to the current and previous observed variables. Moreover, the random components are expected to be mutually independent and conform to a normal distribution with mean 0.
Thus, the model of moving average q-order is denoted as:

$$Y_t = \varepsilon_t - \omega_1 \varepsilon_{t-1} - \omega_2 \varepsilon_{t-2} - \ldots - \omega_q \varepsilon_{t-q}, \quad (4)$$

where Y_t – level of time series at the time point t (dependent variable);
ε_{t-1} – the values of remains i-time periods (independent variables);
$\omega_1, \omega_2, \ldots, \omega_q$ – estimated coefficients.

In accordance with the above-mentioned models, the combination of the autoregression model (AR) and moving average model (MA) present the model ARMA(p,q) :

$$Y_t = \varphi_0 + \varphi_1 Y_{t-1} + \varphi_2 Y_{t-2} + \ldots + \varphi_p Y_{t-p} + \varepsilon_t - \omega_1 \varepsilon_{t-1} - \omega_2 \varepsilon_{t-2} - \ldots - \omega_q \varepsilon_{t-q}. \quad (6)$$

2. Parameter Assessment on the Base of Regression Methods.

Based on the calculated autocovariance for identified ARIMA(p,d,q) model, the initial estimates of moving averages parameters is done. The parameters are estimated based on the least square's method and the maximum likelihood principle.

3. The Diagnostic Testing the Adequacy of the Model.

The remains of the developed stochastic model (ε_t) are used to diagnose the adequacy of the model. Thus, the model quality and remains uncorrelatedness need testing.

4. Using the Model for Forecasting.

According to the abovementioned, in the framework of this paper, a stationary series were obtained using statistical tests for the presence of a unit root (Augmented Dickey-Fuller unit root test). Since, under the Dickey-Fuller statistics, the initial series was non-stationary. Thus, the operator of taking successive differences was used to go to the stationary series. After obtaining a stationary series, the model was identified by evaluating its parameters. Its series of residuals were analysed to check each trial model for adequacy.

Results

As the economy is closely related to tourism development, the significant contraction of tourists is one of the reasons for increasing poverty and economic crisis. It worth noting, several scenarios of economic influence on the tourism industry can be: 1) direct (generating the income from business in the hotel and restaurant business, transport sphere and tourism organisations); 2) indirect (investing in the tourism industry); 3) indicative means the spending the income by the beneficiaries of direct and indirect influences such as the owner of the organisation, employees, etc. (Vasylieva, et al., 2017).

According to the statistical data, 2019 year was one of the most prosperous for tourism and became the trigger for economic development and increasing employment rate. In general, tourism income was 10.3% of global GDP (8.9 USD trillion). Furthermore, the tourism industry provides over 330 mln workplaces (1 out of 10 employees works in the tourism industry). In turn, the total investments cost in the tourism industry was 948 USD billion (4.3% of total investments) (Report, 2019).

In turn, the analysis of statistical data shows that people in Ukraine travel much less compared to ones in EU countries. Thus, in 2018, citizens of Ukraine made 4.48 million trips within Ukraine. This number of trips indicates only about 11% of Ukrainians travelled both inside and outside Ukraine, while in 2015 the corresponding share was less than 5%.

Unfortunately, a significant decline in the number of tourist trips by Ukrainians was in 2014-2015 as a consequence of the political crisis in 2013 and the military conflict in the east part of the country. Following Figure 4, among the analysed EU countries, the most significant number of trips was made by Estonian citizens where one resident had about 6 visits in 2018, while by Lithuanian and Latvian – about 2 visits.

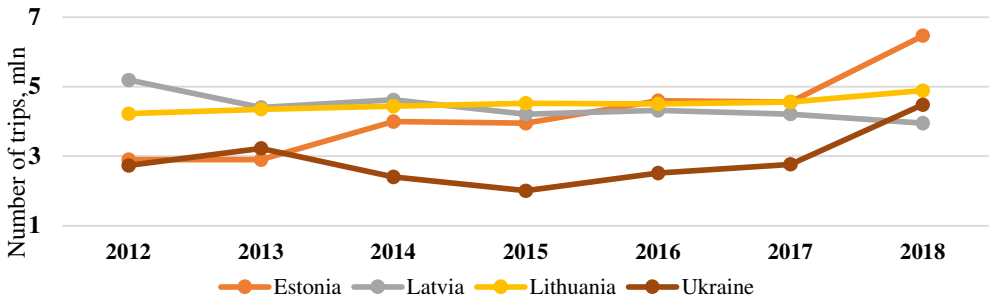

Fig. 4: The Internal and External Trips of Ukrainians, Estonians, Lithuanians and Latvians (2012-2018) (created by the authors based on data of Eurostat (2020), SSC of Ukraine (2020)

However, tourism development has fallen under the influence of the pandemic COVID-19 since the end of 2019. Thus, wide-spreading the virus and implementing the quarantine measures on the global level caused slowing the tourism activity (Figure 5). Following the data of the World Tourism Organization (WTTC), the entrances entirely or partly were forbidden on 96% directions of April 2020. It worth noting all counties of Africa, Asia and Pacific as well as the Middle East, 93% of EU countries and 92% countries of Americas imposed limitations on the movements of people because of COVID-19 spreading.

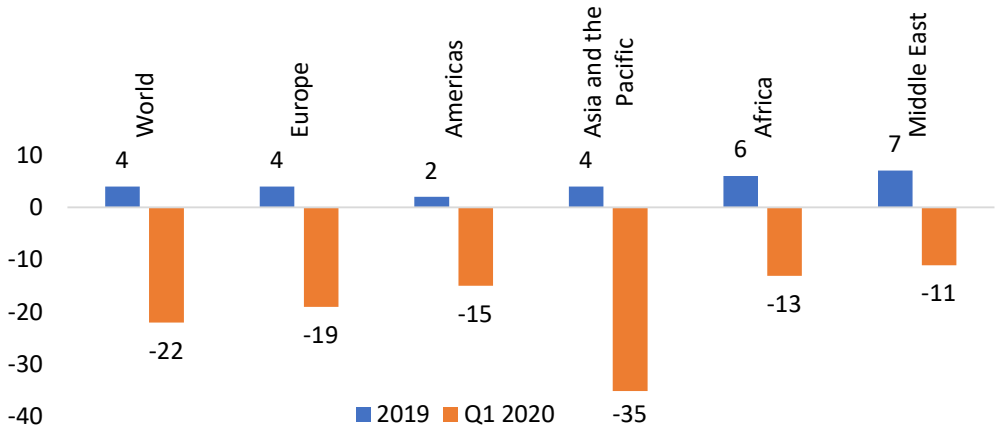

Fig. 5: Changes in Destination Dynamic of International Tourists by the World Regions (% of the previous year) (created by the authors based on (World, 2020)

In turn, there are four main types of limitations to prevent the wide COVID-19 spreading:

1) total or partial borders closures for international tourists;
2) possibility of access to particular places;
3) absolute or partial prohibition against making flights;
4) quarantine procedures, self-isolation, visa ban, etc.

The analysis of official resources allowed noticing the vast amount of publications on the forecast of COVID-19 influence on the tourism industry as on the national as international levels. In turn, according to the estimates of WTTC, the tourism industry would experience damage of 22 billion USD and cause decreasing world DGP by 30% and increasing the unemployment rate by 2.9%. In turn, the WTTC report on the tourism change impact on COVID-19 indicated that the power of the current crisis caused by COVID-19 is fivefold power than the world financial crisis in 2008. Furthermore, the Bloomberg and International Civil Aviation Organization predicted that aviation activity would be on the brink of bankruptcy (World, 2020).

Table 3: The dynamic pattern of site traffic (from December 2019 to April 2020) (SimilarWeb, 2020)

Sphere	Site	12.19	01.20	02.20	03.20	04.20	Growth rate
Air travel	skyscanner.com	13.8	16.2	13.3	9.05	3.5	-74.64
	turkishairlines.com	8.6	8.95	8.3	8.3	3.1	-63.95
	ryanair.com	37.8	45.2	38.4	35.1	14.1	-62.70
	wizzair.com	12.5	13.6	12	10.6	4.25	-66.00
	airasia.com	18.3	17.8	16.1	15	5.1	-72.13
Accommodations and Hotels	hilton.com	24.3	26.7	24.4	16.1	7.9	-67.49
	hotels.com	54.2	61.6	54.2	30	9.95	-81.64
	agoda.com	67.1	65	52.6	37.5	17.5	-73.92
	airbnb.com	73.8	90.6	81	54.8	26.3	-64.36
	booking.com	424	507.5	427.5	242.5	90.5	-78.66
Travel and Tourism	traveltrivia.com	10.4	12.2	10.3	10.7	9.35	-10.10
	tripadvisor.com	151.5	165	148	90	54.1	-64.29
	eastday.com	55.2	52.9	54.2	56.9	49.8	-9.78
	expedia.com	69.1	78.6	69.7	48	16.2	-76.56
	ctrip.com	37.2	30.9	12.9	13	13.8	-62.90
Ground transportation	uber.com	78.9	73	66.4	58.8	43.7	-44.61
	olacabs.com	5.15	4775	4.55	3.15	0.95	-81.55
	lyft.com	20.4	21.6	17.1	12.6	6.4	-68.63
	thetrainline.com	27.4	27.3	26.3	14.5	4.15	-84.85
	blablacar.com.ua	3.85	3.25	3.1	3.35	1.4	-63.54

Nowadays the tourism activity depends on the high level of transport and communication networks, restaurant and hotels complex, social sphere, etc. In turn, the limitation of movements caused by the quarantine regime led to significant losses in the mentioned above spheres. Table 3 demonstrates the traffic dynamic of the company sites providing tourism services by month from December 2019 to March 2020. Thus, the traffic of analysed sites in the category "Air travel" decreased by 68%, while in the category "Accommodation and Hotels" – by 73,2%, "Travel and Tourism" – by 44,7%, "Grounded transportation" – by 69%. According to the analysed sites, the level of demand decreased most of all in the category "Accommodation and Hotels."

Restrictions on international travel, as well as the introduction of quarantine to combat the spread of the COVID-19 pandemic, lead to large-scale losses in the tourism industry. It worth noting that the current crisis has biological nature, and an effective vaccine has not yet been invented to prevent the COVID-19 virus. Thus, the lack of drugs, mass quarantine and large-scale self-isolation has become the main methods of combating COVID-19. Consequently, the freedom of residents' movements in most countries is severely restricted.

Figure 6 displays the dynamics of people moving during the COVID-19 pandemic. The initial data are the requests of plotting the routs by the users of Apple products in Ukraine from 13 January 2020 to 09 May 2020. Thus, with the entry into force of quarantine restrictions, the walkings and drivings declined sharply. At the same time, the lowest number of people walking and driving denoted on 19 April 2020 (-64.66% compared to 13 January 2020), after which there is a positive tendency of movings. Moreover, the number of driving trips remained consistently higher during the investigated period, though much lower than the baseline level on 13 January 2020.

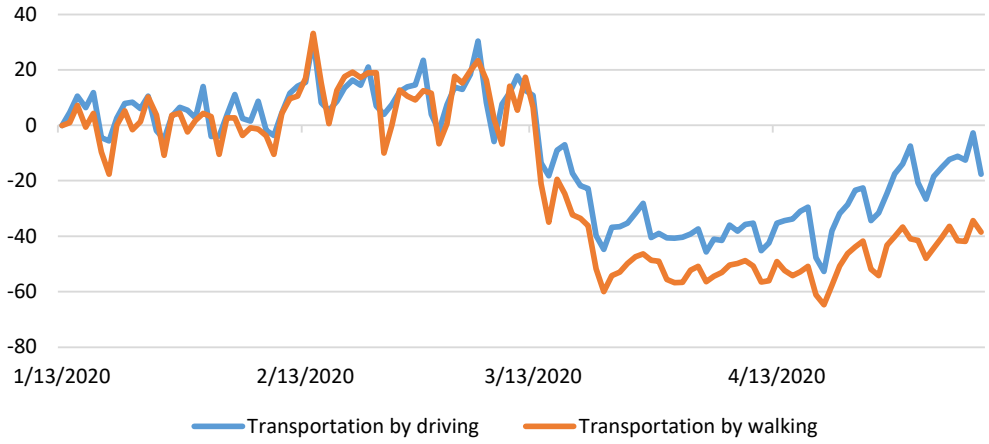

Fig. 6: The Dynamic Changes in the Number of the Request of Plotting the Routs by Apple Users in Ukraine (13.01-09.05.2020) (created by the authors (Apple, 2020).

Thus, based on the ARIMA model, which is one of the most popular extrapolation models, the forecast of several scenarios of the COVID-19 impact on the driving trips by Ukrainians was made upon the following conditions:

1) without the introduction of quarantine restrictions from 11.03.2020;
2) taking into account the quarantine restrictions on movements.

Thus, developing this model provides short-term forecasting of change of inquiries of inhabitants of Ukraine concerning laying of routes for movement by vehicles. In general, the built forecast can be used in making management decisions to develop a strategy for overcoming the tourism recession.

Thus, the empirical study was conducted using EViwes software based on daily requests from users of Apple products in the routing of routes within Ukraine from 13.01.2020 to 09.05.2020. The dynamics of the studied series is shown in Figure 7.

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.502776	0.5286
Test critical values:	1% level	-3.490772	
	5% level	-2.887909	
	10% level	-2.580908	

Fig. 7: The stationary test of time series (Augmented Dickey-Fuller unit root test)
(calculated by the authors)

The Dickey-Fuller test was used to check the time series for stationarity. According to the value of the ADF test criterion (Fig. 8), the time series is non-stationary, as the value of t-statistics is higher than the critical values.

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-17.86760	0.0000
Test critical values:	1% level	-3.490772	
	5% level	-2.887909	
	10% level	-2.580908	

Fig. 8: The First Differences of the Logarithmic Time Series (Augmented Dickey-Fuller Unit Root Test)
(calculated by the authors)

Thus, since the dynamics of requests was unstable, the forecast model development may be inaccurate. In this regard, the studied time series was reduced to a stationary one using the first differences of the time series logarithm (Figure 9). As a result, the time series is stationary and can be used to build the ARIMA model forecast.

For the first development scenario, we will analyse the dynamics of requests in the case when the people in Ukraine would not be limited to quarantine measures from 12 March 2020 and continue their usual way of life. The data for the study were selected from 13 January to 11 March 2020.

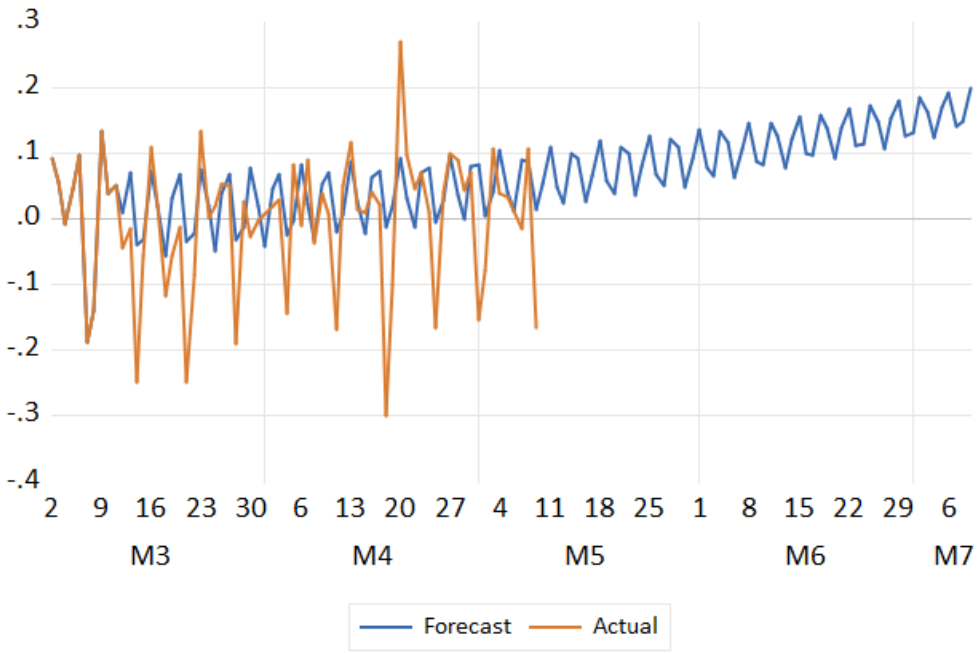

Fig. 10: The Forecast of the Number of the Requests of Plotting the Routs by Apple Users in Ukraine without Quarantine Restrictions (from 13.01.2020 to 11.03.2020)

In turn, Figure 10 demonstrates the short-term forecasting the requests dynamics of Ukrainian residents in laying travel routes by vehicles until 11 May 2020 according to data from 13 January 2020 to 11 March 2020, while in Figure 11 – until 11 July 2020 based on data from 13 January 2020 to 11 May 2020.

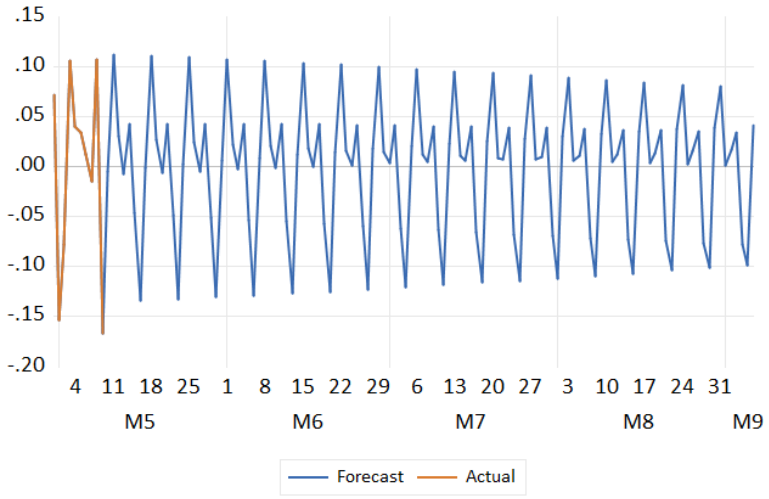

Fig. 11: The Forecast of Number of the Requests of Plotting the Routs by Apple Users in Ukraine with Quarantine Restrictions (from 11.03.2020 to 11.07.2020)

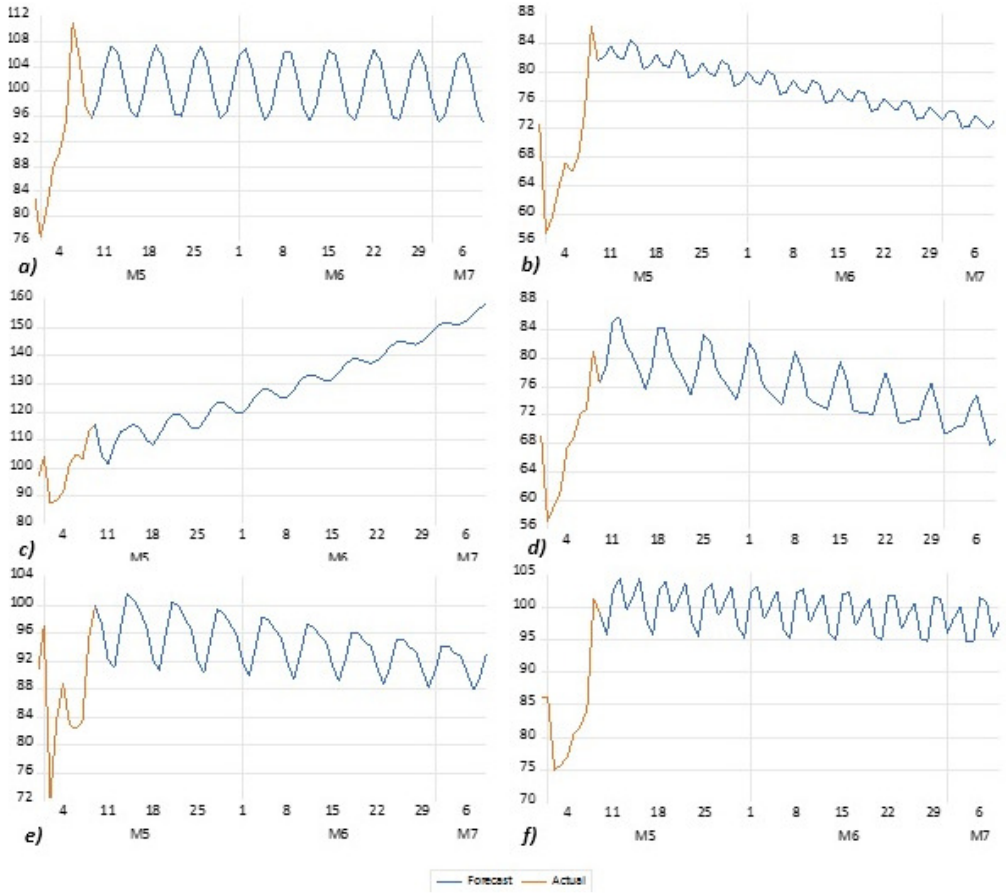

Fig. 12: The Forecast of the Number of the Requests of Plotting the Routs by Apple Users in *a)* Czechia; *b)* Poland; *c)*Estonia; *d)* Hungary; *e)* Latvia; *f)* Lithuania in Case of Quarantine Restrictions (from 09.05.2020 to 10.07.2020)

Thus, the obtained results of the forecast indicate that the adopted quarantine measures had a significant impact on the movement of residents within investigated countries. Particularly, if the quarantine measures were not introduced from 12.03.2020 and the population continued to live a normal life, the trend of movement would have rapid growth and did not have a significant impact on tourism in Ukraine. However, the second development scenario, subject to the introduction of quarantine restrictions from 09.05.2020, indicates that the dynamics of population movement will have a slightly positive trend that slowed down the tourism activity.

Figure 12 demonstrates the forecast models for EU countries which allowed assuming if the quarantine proceeds, the tourism activity would totally recess. Thus, it is strategically important to: form a reliable image of the investigated countries and increase the competitiveness of the tourism market; forme new proposals, ensuring a high level of hygiene and safety; attract innovative management methods and active use of modern information technology.

Conclusions

The systematisation of scientific resources indicated a growing publication activity on the link between tourism and economic growth. Notably, the bibliometric analysis based on the VOSviewer tool allowed to identify 9 clusters demonstrating the thematic areas of scientific publications in the investigated field. It worth noting that the most massive cluster (61 terms) aimed at studying the relationship between tourism and environmental issues. In turn, a slightly smaller cluster (49 terms) mainly indicated the study of economic growth and tourism development. The third big cluster (48 terms) is thematically focused on research in the field of economic development, tourism and climate change.

In the frame of this work, it was established that the tourism industry played a significant role in the economic growth of any country. However, nowadays the tourism sector is one of the worst-affected by the outbreak of the COVID-19 pandemic. Moreover, measures taken to combat the COVID-19 pandemic have harmed economic growth and have significantly restricted population movement, both inside and outside the country.

The development of domestic road tourism is one of the areas of recovery of the tourism sector. Given that, the paper predicts possible scenarios for the development of the tourism industry in Ukraine and EU countries of post-soviet past (Latvia, Lithuania, Estonia, Poland, Czechia and Hungary) during the pandemic COVID-19 based on the dynamic requests for routs plotting by Apple users in Ukraine (from 13 January to 9 May 2020). The development of domestic automobile tourism is one of the areas to begin recovering of the tourism sector. Based on the ARIMA model, the authors developed the possible scenarios for the development of the tourism industry of Ukraine during the pandemic COVID-19. The model was based on the number of the Apple users requests for plotting the routs in Ukraine from 13 January 2020 to 9 May 2020. In turn, the obtained results of the forecast indicated that the adopted quarantine measures have a significant impact on overcoming the recession in the tourism industry in conditions of economic, social and political tension.

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