The Impact of Domestic Passenger Transport on International Tourism Development

Olga Sazonets
University of Customs and Finance, Ukraine
ORCID: 0000-0001-6521-7815, e-mail: onsazonets@gmail.com

Viktoriia Vovk
Stanisław Staszic University of Applied Sciences in Piła, Poland
ORCID: 0000-0002-8187-4257, e-mail: viktoria.vovk@puss.pila.pl

Agnieszka Kister
Maria Curie-Sklodowska University in Lublin, Poland
ORCID: 0000-0001-9571-8792, e-mail: agnieszka.kister@poczta.umcs.lublin.pl

Abstract: The overall objective of this paper is to study the prospects for the development of domestic transport of passengers in selected countries for the next five years and to establish the correlation between domestic transport of passengers and travel and tourism (T&T) industry's contribution to GDP in these countries, as well as the suburbanisation of Ukraine, Poland, the USA, China and India. The analysis of the forecast of the dynamics of domestic transport of passengers in comparison with the dynamics of GDP per capita and the CPI allows us to state that in the next 5 years the economies Poland, China and India will expand (i.e. there will be GDP per capita growth) for each of the projected scenarios (realistic, optimistic and pessimistic). The only exception is Ukraine, where this figure will be 95-96% depending on the selected scenario. The conducted research shows that from 2021 to 2025, the projected GDP per capita growth in Poland will amount to 12.03%. According to the realistic forecast, this will affect the increase in domestic transport of passengers, which will amount to 120.8%, with a decrease in the CPI to the level of 32.8%. The United States and India will demonstrate similar patterns. Particularly, the projected GDP per capita growth in the US will amount to 106.1%, while domestic transport of passengers will be equal to 108.9% and the CPI will fall to 86.8%. At the same time, in India the GDP per capita is expected to reach 118.7%, with domestic transport of passengers amounting to 169.4% and the CPI amounting to 57.6%. Hence, the analysed indicators suggest that the economic situation in Poland, USA and India will facilitate the transport industry's development in the subsequent 5 years.

Key words: transport industry, international tourism, transport of passengers, GDP; forecast.

JEL: L91; L83; F43

Introduction

Transport is a popular research topic that is analysed from many standpoints. One of the perspectives is the relationship between transport and tourism (Borkowski et. al, 2021). Experts believe that transport infrastructure is the decisive factor in the attractiveness of a tourist destination, as it provides a vital basis for the provision of tourist services (Khadaroo et. al., 2008). Many studies see transport as a key component of the tourism system and an important economic sector for countries, which has a great importance to increasing

competitiveness, social development, and integration (Koziuket. al., 2019; Klapkivet. al., 2020; Vovk et. al., 2018). Transport is an important instrument for ensuring mobility, as well as contributing to the free movement of people in the internal market (Transport in the European Union, 2019), hence, it leads to changes in the general tourist flows. Quite often, well-known scholars consider transport networks to be one of the most imperative components of successful tourism development, arguing that "transport plays an important role in the successful creation and development of new attractions as well as the healthy growth of existing ones" (Kaul, 1985). However, even though many authors acknowledge the importance of transport for successful tourism development, the study of the strength of the relationship between tourism and passenger transport has not been given much attention in the existing literature so far.

The overall objective of this paper is to study the prospects for the development of domestic transport of passengers in selected countries for the next five years and to establish the strength of the relationship between domestic transport of passengers and travel and tourism (T&T) industry's contribution to GDP in these countries. The study will consist of two parts: the first concentrates on forecasting the dynamics of domestic transport of passengers in selected countries until 2025 on the basis of actual data for 2010-2018 in comparison with the dynamics of GDP per capita and the Consumer Price Index (CPI) of these countries, and the second part examines the closeness of the relationship between the transport and tourism industries in 2010 – 2018.

Theoretical premises

Transport is a vital component of national and global economies. Acceleration of the interaction of all economy sectors necessitates the constant development and improvement of the transport sector. The growth of industrial production and international trade requires changes in the global transport sector and it surely becomes a key globalisation factor. According to the World Bank, in 2018, global transport services accounted for a total of 19.2% of global services exports, while imports of sea, air, land, internal waterway, space, and pipeline transport accounted for a total of 22.6% (The World Bank, 2021).

Research shows that passenger traffic growth depends on many factors, including geographical location, GDP, total population, and human development index. Nonetheless,

the significance of these factors varies for different countries. In particular, Japan, Nigeria, Spain, Turkey, Brazil, the United Kingdom, China, India, and the United States demonstrate the greatest relationship between passenger traffic and the geographical location of the countries (Inan et. al., 2021).

The regional distribution of industrial production depends on the development of transport infrastructure, although, on the other hand, the transport sector significantly dependents on the development of material goods, as they require the use of transport in order to perform their tasks. Similarly, the tourism business adapts to the transport infrastructure, as for this business transport of passengers does not only provide the logistical support for tourists aiming to deliver them to their destinations (Khan et. al., 2017), but it also serves as an important resource for social and economic development of the corresponding tourist region. The decision-makers increasingly more often use regional development tools for both the transport sector and the tourism industry, as these two industries are viewed as partners in tourism services chain (Bezerra et. al., 2019). J. Khadaroo & B. Seetanah believe that the government should integrate transport policy into tourism planning, especially for countries with poor infrastructure, as investment in tourism infrastructure, marketing efforts and air transport liberalization may be futile without consistent financial support of the state for the transport infrastructure's needs. The scientists emphasize that policy makers should develop an integrated, efficient and affordable transport system that is sustainable from social, economic and environmental points of view. Broad participation of different interest groups, particularly from the tourism sector and consumers, is essential for the effectiveness of such planning (Khadaroo et. al., 2008).

In his paper, C. Puchongkawarin discusses the close link between transport and tourism (Puchongkawarin et. al., 2020); the aforementioned study states that improving transport logistics leads to improved quality of tourism services. With the use of mixed research methods based on quantitative and qualitative analysis, the authors were able to confirm that the optimisation of transport routes leads to increased satisfaction of tourists with the services. Tourism brings strategic value to transport of passengers and offers a selective business method for the introduction of tourism in transport companies (Xiuting, 2006). Providing appropriate transport can turn the so-called "dead" tourism centres into active and prosperous places that attract many people. An attractive transport system considerably depends on the quality and accessibility of transport infrastructure, which includes air

transport and airports, land transport systems and routes, as well as water transport infrastructure (Xiuting, 2006). In reality, the transport system is responsible for the connection between the places of tourism origin and tourist destinations, as well as for providing transport connections within the tourist destination, i.e. hotels, shops, attractions, etc. (Khadaroo et. al., 2008). Furthermore, the positive effect of pleasant tourist impressions can be extrapolated to the judgment of passengers about their tourist destination (Bezerra et. al., 2019). Therefore, transport infrastructure contributes to tourist demand (Khadaroo et. al., 2007).

Development directions of the world economy have fundamentally influenced changes in transport, which has become an indispensable element of modern social and economic processes (Motowidlak, 2017). The idea of sustainable development and the need to adjust the transport development strategy in the European Union to follow it, have been exposed in the White Papers on Transport, where the development of competitive transport is connected with the efficient use of resources, for almost three decades. The paradigm of sustainable development is based primarily on the policy of economic interventionism, whereas the globalisation processes result from the basic mechanisms of the market economy, mainly competition (Kumar, 2021). Studying sustainable transport in the world economy and in the economies of individual countries is a justified research direction (Liu, 2003). This issue requires further analysis in relation to the economies of individual countries.

Nicole Adler et al. argue that transport infrastructure development in a particular country depends on many factors related to market indicators in the transport network, including the behaviour of players in the transport market (Adler et. al., 2021). In their paper, Qi Cuia et al. clearly demonstrate the vast impact of the currently ongoing COVID-19 pandemic on transportation and non-transportation sectors, as well as on China's macro-economy (Cuia et. al., 2021).

A country's economic development is closely linked with the development of its transport infrastructure, the transportation business activity, and its transit potential. These components are the roots of every business. At the same time, transport of passengers is a significant part of transportation services in each country. Furthermore, it also forms the added value of the industry. Passenger transportation companies decide to expand their business, including abroad. In this situation, they have to determine the priority areas of passenger traffic flow. We should underline that transport of passengers also has

a significant impact on the development of tourism business. Then, tourism and its development are based on a combination of various social, cultural, economic, and transport factors in each country.

Methodology

In order to analyse the situation in Poland and Ukraine more objectively, we have additionally selected the United States, India, and China as the countries that had been considered the most powerful states over the last decade in terms of their transport of passengers.

The initial data of the study include the indicators of local transport of passengers, which are reflected in the EU ODP (The European Union Open Data Portal, 2021), GDP per capita and Consumer Price Index (CPI) from Trading Economics portal (Trading Economics, 2021a; Trading Economics, 2021b), as well as indicators of travel and tourism (T&T) industry's contribution to GDP, which are reflected in the World Economic Forum Travel and Tourism Competitiveness Reports (World Economic Forum, 2011-2019).

We used the statistical analysis functions of MS Excel as research methods. While forecasting transport of passengers, we used the Excel FORECAST.ETS function, in order to calculate the confidence interval, we addressed the FORECAST.ETS.CONFINT function with a probability of 0.95, which returns a confidence interval for a forecast value at a specific point on a timeline. The results of the latter calculations are reflected in the graphs using low probability binding and high probability binding lines.

Results

According to the aforementioned research results, social and economic indicators affect the movement of people by transport (Erik et. al., 2021). Social and economic indicators change not only within the society, but in general from country to country.

It is worth mentioning that market indicators also impact the state of the transport industry in a country, as they attract both competition and cooperation within the state (Adler et. al., 2020). Hence, it is essential to study the dynamics of the transport industry in particular countries.

Our paper presents an analysis of the transport development and the relationship between this industry and tourism in countries such as Poland, Ukraine, USA, China and India. The choice of Poland and Ukraine for the study is due to the origin of the authors of the article. At the same time, the United States and China are the world's leading economies with the world's most powerful transportation systems and significant tourism potential. As a counterbalance to the US and China, we selected India as the country that, despite its relatively low economic status, has the strongest use of its own transportation system. We will study the situation with regard to domestic passenger transport in more detail for each of the above-mentioned countries and assess the forecast indicators with the use of low probability binding and high probability binding lines.

The transport industry plays a key role in Poland's economy. GDP growth in the transport sector is higher than the country's overall GDP growth rate. 70% of the country's passenger transport accounts for passenger cars, i.e. light duty vehicles. However, over the past few years, the volume of air traffic has also increased significantly. From 2008 to 2016, this sector grew at an average annual rate of 3%.

After the end of the financial crisis of 2007–2008, also known as the global financial crisis (GFC), there has been an increase in domestic transport of passengers in Poland, which is also evident in the future trends (Fig. 1).

Figure 1. Dynamics and Forecast of Domestic Transport of Passengers in Poland
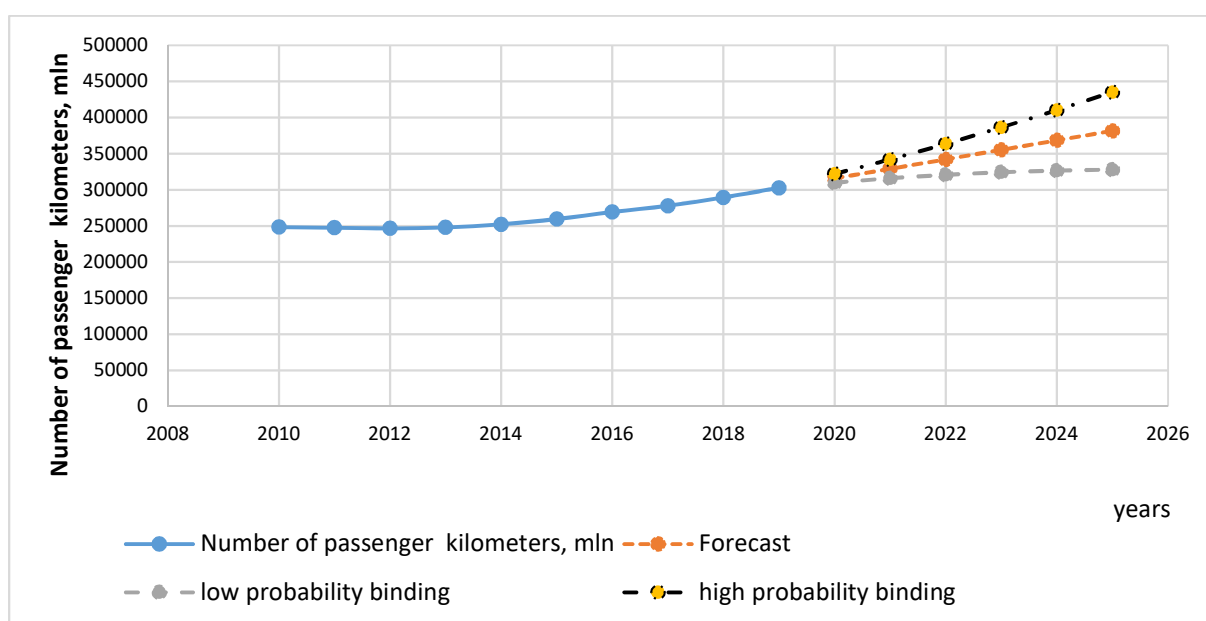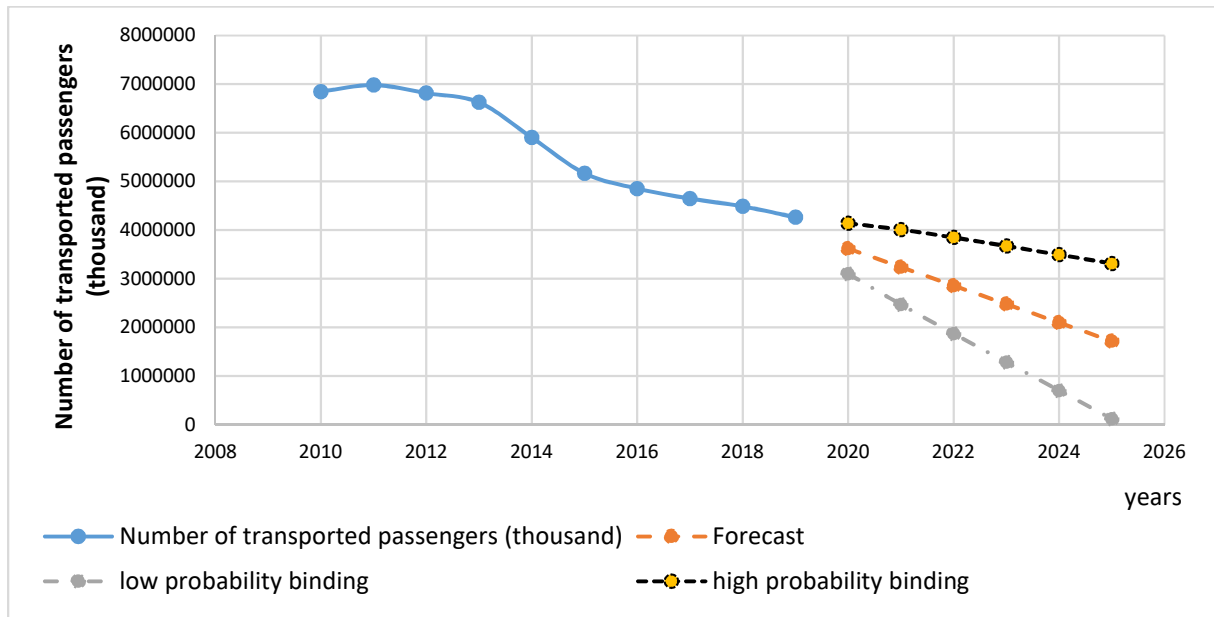

Source: own study, based on The European Union Open Data Portal (2021)

The access to the EU-28 freight market also facilitated the growth of transport of freight, which certainly affected changes in transport of passengers. According to Eurostat, the GFC that began in 2008 had led to a significant reduction in transport over the next 4 years. The freight transport, which in 2008 amounted to 1.89 trillion tonne-kilometres (tkm), in the years 2009-2013, fell to the range of 1.69-1.77 trillion tkm. Only in 2017, the transport sector increase helped to get above the pre-crisis year (PwC, 2019). During the period from 2009 to 2013, the negative dynamics in freight transport was accompanied by negative dynamics of GDP, however in subsequent years, GDP growth was accompanied by even higher growth rates of the transport sector, which clearly indicates the high dependence and vulnerability of this industry to changes in GDP. The growth of GDP and foreign trade, among other reasons, is partly due to the entry of Polish hauliers into the export market of transport services. Presently, hauliers from Poland rank first in total transport operations of the EU-28, leaving German and French hauliers behind.

As we can see from Figure 2, in Ukraine, the use of transport by Ukrainian passengers is declining and the forecast in this regard is also quite unfavourable. Particularly, the reduction of passenger flows due to the military conflict in the East of the country had a significant impact on the negative dynamics of the indicators. In order to overcome these negative phenomena, there is an obvious need to both make changes to national legislation and cooperate with other countries in the field of transport. It is good to note that some steps in this direction are already being taken. For instance, they include the adoption of the Resolution of the Cabinet of Ministers of Ukraine No. 180, dated February 2018, "On Amendments to the Tender Procedure for Passenger Transportation on a Public Bus Route", according to which "contests for interregional bus routes will now be held on an application basis" (Resolution of the Cabinet of Ministers of Ukraine, 2018). There will also be an opportunity for those carriers who have upgraded their fleet of vehicles to extend the permits.

Figure 2. Dynamics and Forecast of Domestic Transport of Passengers in Ukraine

Source: own study, based on The European Union Open Data Portal (2021)

In order to improve the situation in the field of transport, the government implements the applicable legal provisions declared in the Association Agreement between the European Union and Ukraine. Article 368 of the Association Agreement foresees facilitation of the restructure and renewal of the transport sector of Ukraine and the gradual harmonisation of existing standards and policies with those in the EU.

The development of concession roads in Ukraine, which will increase the transport of passengers by road, is a positive phenomenon in this area.

Today, one can also see that the convenience of purchasing transport tickets is growing. For instance, in 2020, the passengers of Ukrainian Railways (Ukrzaliznycia) bought 66% of tickets online (Ministry of Infrastructure of Ukraine, 2021).

Presently, the Verkhovna Rada of Ukraine (the unicameral parliament of Ukraine) is considering draft legislation on public-private partnership in the road sector, which stipulates the involvement of private investors for road construction. The payback of the projects is planned for 20-30 years after the completion of construction and will depend on the quality of the road, which is built and subsequently maintained. There will not be road tolls for citizens. At the same time, poor road maintenance and non-compliance with accepted standards may lead to fines.

In the United States, domestic traffic is growing and, according to our forecast (Fig. 3), this trend will continue. However, the predicted growth will be slow.

Figure 3. Dynamics and Forecast of Domestic Transport of Passengers in the USA
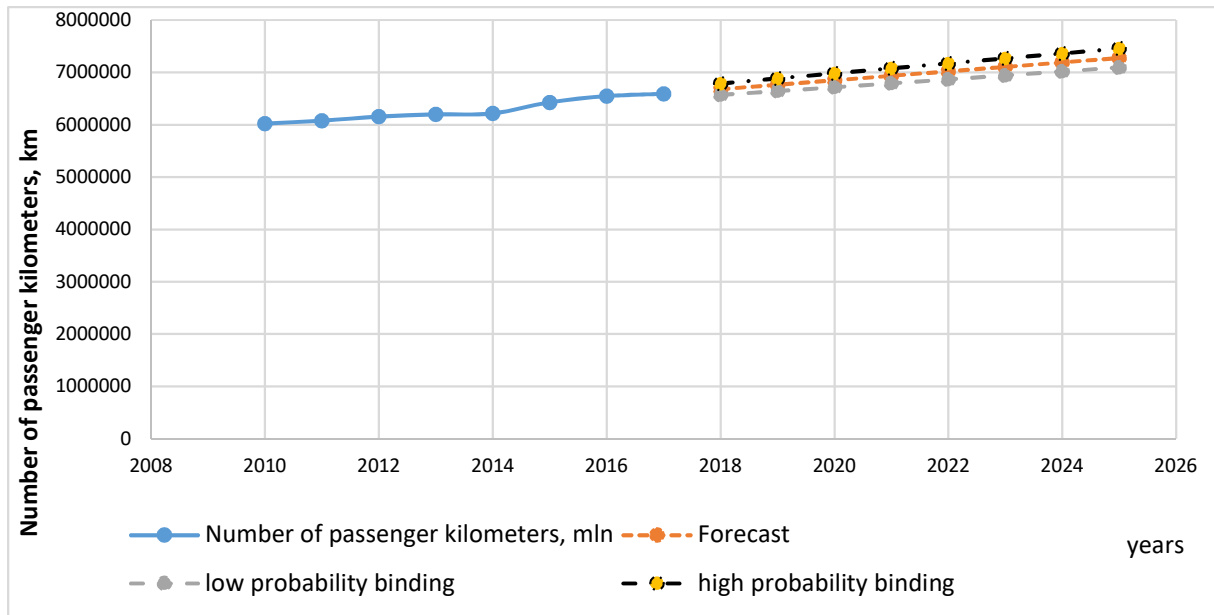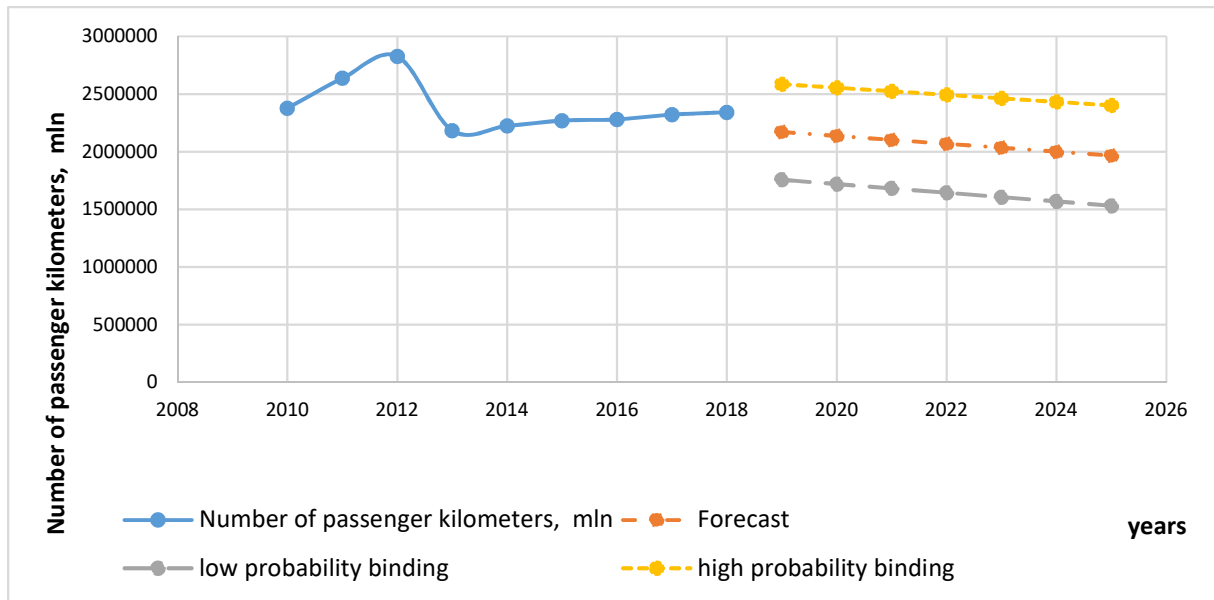

Source: own study, based on The European Union Open Data Portal (2021)

The slow pace of the growth of US domestic traffic has a number of reasons, namely the following:

1. The majority of citizens more and more often use personal transport because cars and fuel are getting cheaper.

2. More and more Americans prefer used cars because they are cheaper and at the same time meet quality requirements.

3. Nowadays more Americans prefer to travel abroad because of the economy and social life globalisation trends, as well as the development of the international business component.

4. Many issues are solved without leaving the offices, online, so the number of business trips has reduced.

5. Foreign tourism replaces domestic tourism due to the promotion in social media and posts with photos of landscapes or views of other countries.

6. International air travel has become very cheap for Americans. Thus, domestic transport is not used as actively as before.

In China, there are some fluctuations in domestic transport of passengers, while in general the domestic transport is declining (Fig. 4).

Figure 4. Dynamics and Forecast of Domestic Transport of Passengers in China
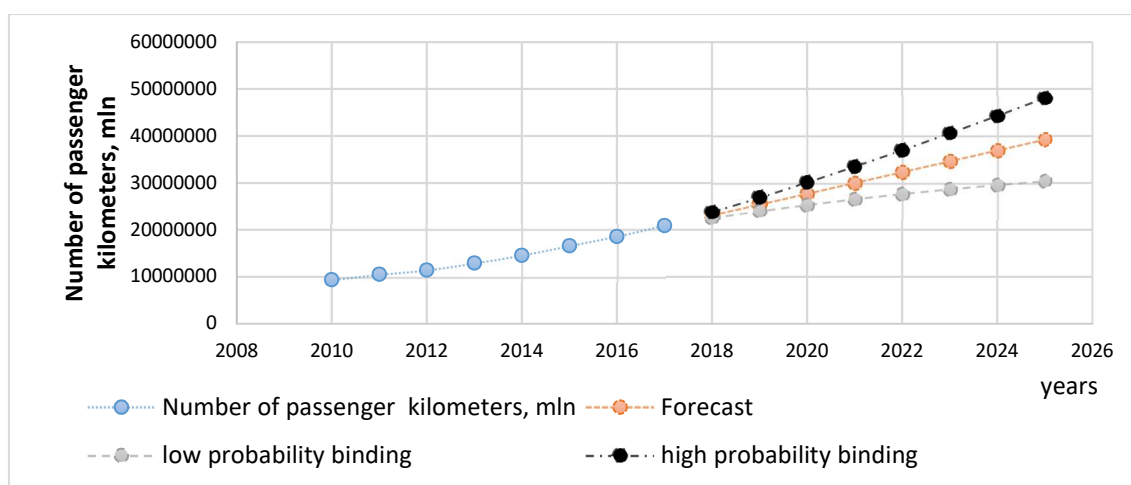

Source: own study, based on The European Union Open Data Portal (2021)

These trends became especially evident due to the rapid emergence and spread of the coronavirus disease (COVID-19) in the country. Nonetheless, over time the situation gradually began to improve. Hence, in case of Chinese railways, there is an increase in the number of passengers due to the resumption of production and improvement of the economic situation. In particular, there is currently an increase in rail passenger transport (in number of passengers) by an average of 60 thousand people per day. For example, CSR Company, a locomotive manufacturer, organised 115 charter trains and it carries 123,000 workers daily from their places of residence to work. The number of stops is as low as practicable. Simultaneously, the company strives to ensure a safe and orderly resumption of work. Essentially, 199,000 workers resumed work in 2,817 divisions of the company. The relevant teams implement 90 key railway projects at these production sites. All of the noted projects are directly related to the transport industry. It is worth mentioning that in order to strengthen the work on COVID-19 prevention, the corporation cooperates with local authorities on a large number of construction sites. In total, the country's railways have transported more than 181,000 tons of cargo related to the control and prevention of the spread of COVID-19.

India has demonstrated a rapid increase in the transport of passengers; both in recent years and according to the forecast (Fig. 5). In this country, due to the pandemic, in March 2020, the transport of passengers has been suspended completely. Nonetheless, in May, the government restored the transport services. On May 25, 2020, two months after a lockdown to curb the spread of coronavirus and subsequent ban of flights, India partially resumed regular passenger flights. However, so far only domestic flights between the Indian states have been resumed.

Figure 5. Dynamics and Forecast of Domestic Transport of Passengers in India

Source: own study, based on The European Union Open Data Portal (2021)

Indian citizens greeted the resumption of commercial passenger traffic with caution. According to local media, the flights carried only 25-50% of passengers out of their pre-covid capacity. Moreover, after the pandemic, most passengers prefer to travel not only in masks, but also in personal protective suits and in gloves.

Overall, in India one can travel around the country not only by standard, but also by less common types of transport: from public and private buses and an extensive rail transport network to low-cost aviation segment and rickshaws, which are quite exotic for Ukrainian and Polish tourists.

In order to fully assess the forecast of domestic transport of passengers in Poland, Ukraine, the United States, China and India, there is a need to pay attention to GDP per capita of these countries (Fig. 6) in combination with the dynamics and forecast of the Consumer Price Index (Fig. 7).

As the analysis of the charts shows, GDP per capita is growing in all countries, and growth is close to a linear function with high accuracy, which is illustrated by small deviations in confidence intervals, except for Ukraine, which has in recent years demonstrated an improving trend. This suggests that the economies of Poland, the United States, China and India are growing along with the growth of the population in these countries. According to the World Bank data, the economic growth rates of China and India in the 21st century are much higher than the world average, despite the fact that the population of these countries is over a billion people. This was primarily due to the financial reforms that began in China in the late 1970s and in India in the mid-1990s. Hence, it can be argued that the governments of Poland, the United States, China and India have managed to create self-sufficient economies, which, according to the forecast analysis, will continue to improve the standard of life and wellbeing of their citizens in the ensuing years.

Consumer Price Index, which, according to the forecast, indicates a trend toward decline, evidently confirms the growing efficiency of economic policy of these countries. The charts depicted in Figure 7 show pronounced fluctuations, although the forecast for all countries shows a decline in this indicator. In reality, the purchasing power of the currencies of Poland, the United States, China and India will increase. This tendency will allow the citizens of these 4 countries to hypothetically spend more on their needs, which include transport and tourism. At the same time, one can observe less optimistic changes in Ukraine. However, the data in Figure7 indicate that the gaps in the confidence intervals are very large due to significant fluctuations, and therefore the trend is traced with significant errors.

Figrue 6. GDP per Capita Dynamics and Forecast in Poland, Ukraine, USA, China and India
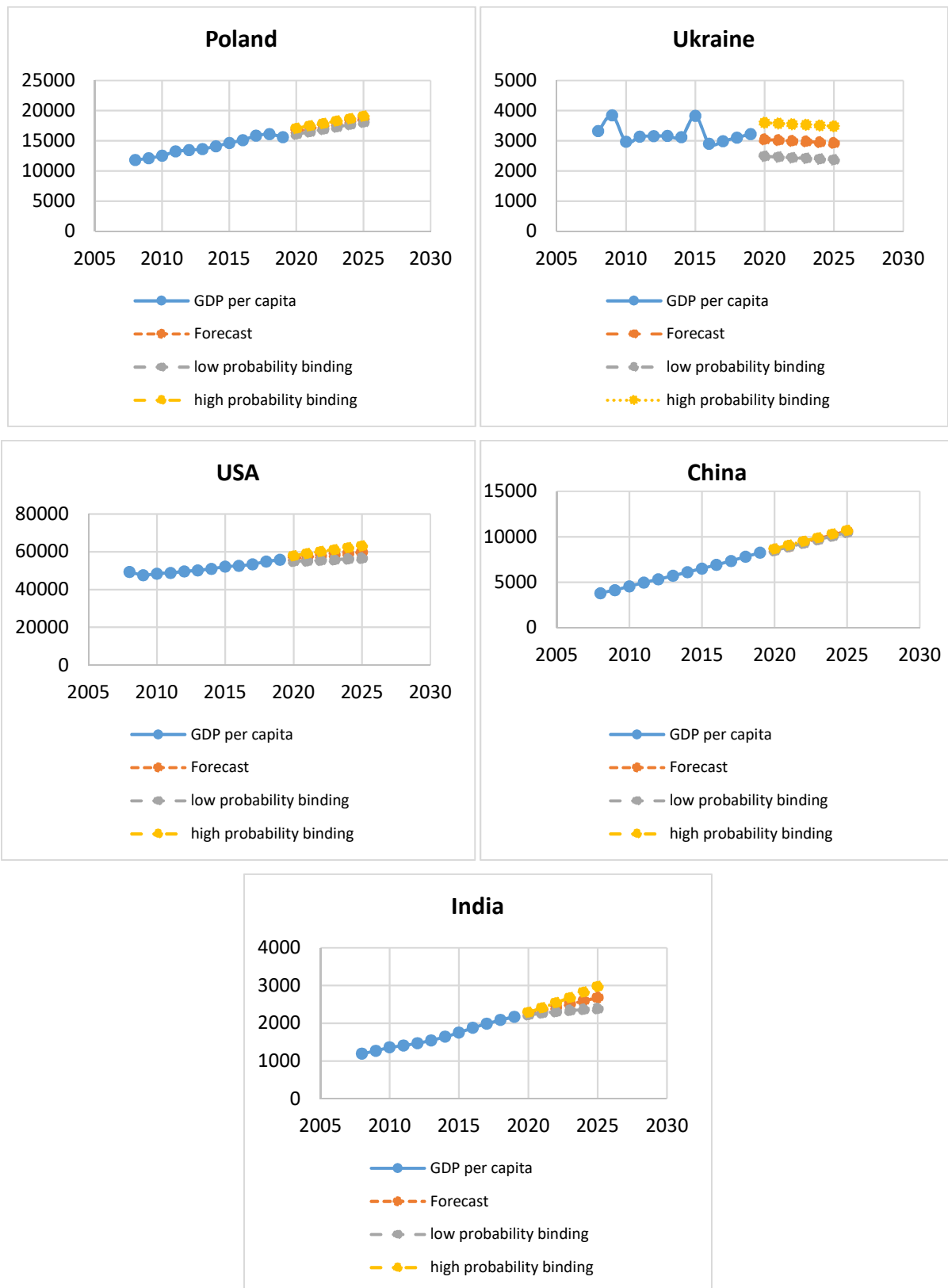
Source: own study, based on The European Union Open Data Portal (2021)

**Fig. 7.** Consumer Price Index Dynamics and Forecast in Poland, Ukraine, USA, China and India
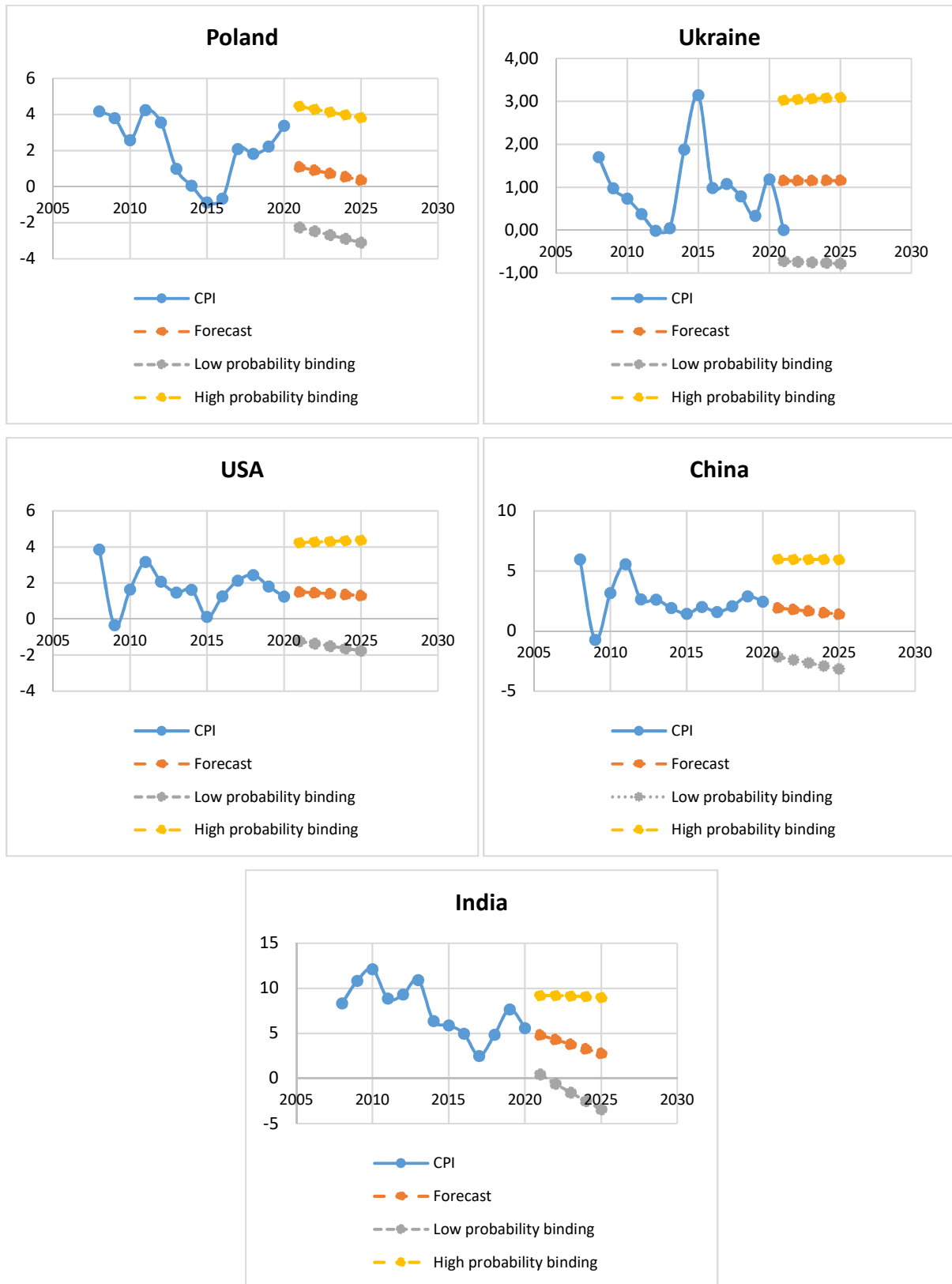
It is possible to establish the closeness of the relationship between the transport and tourism industries by finding the dependencies and nature of the relationship between the dynamics of domestic transport of passengers and the dynamics of the contribution of tourism and travel to GDP. The term 'tourism' is intended to refer to T&T industry GDP, provided by the World Travel & Tourism Council, Tourism Satellite Account Research (World Economic Forum, 2011; World Economic Forum, 2013; World Economic Forum, 2015; World Economic Forum, 2017; World Economic Forum, 2019).

Figure 8 clearly demonstrates that, even with small number of passenger-kilometres, the number of tourist trips in Poland does not significantly change. We believe that this phenomenon can be linked to the following travelling tendencies: people use mainly own cars for short distance tourist trips, they combine business trips and visiting close relatives with visits to tourist attractions. However, with the increase in passenger-distance (in km), there is a correlation between these two indicators. This dependence is close to the fourth-degree polynomial (also known as a quartic polynomial). Nevertheless, the standard deviation is not acceptable (R^2=0.5387) due to the lack of connections at low number of passengers transported.

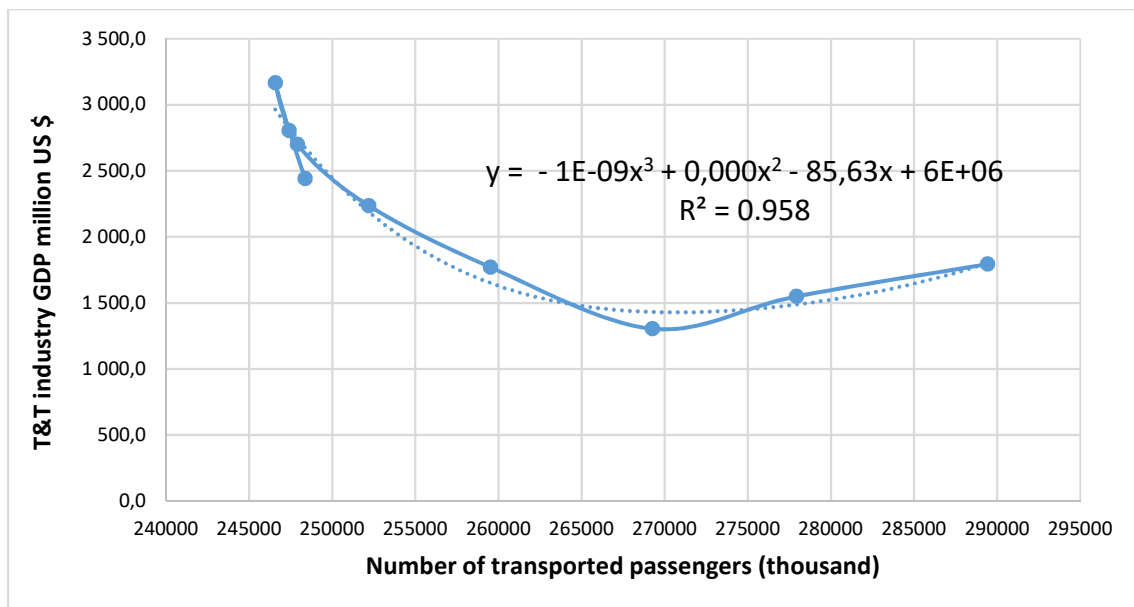**Figure 8.** Dependence of Tourism on Domestic Transport of Passengers in Poland
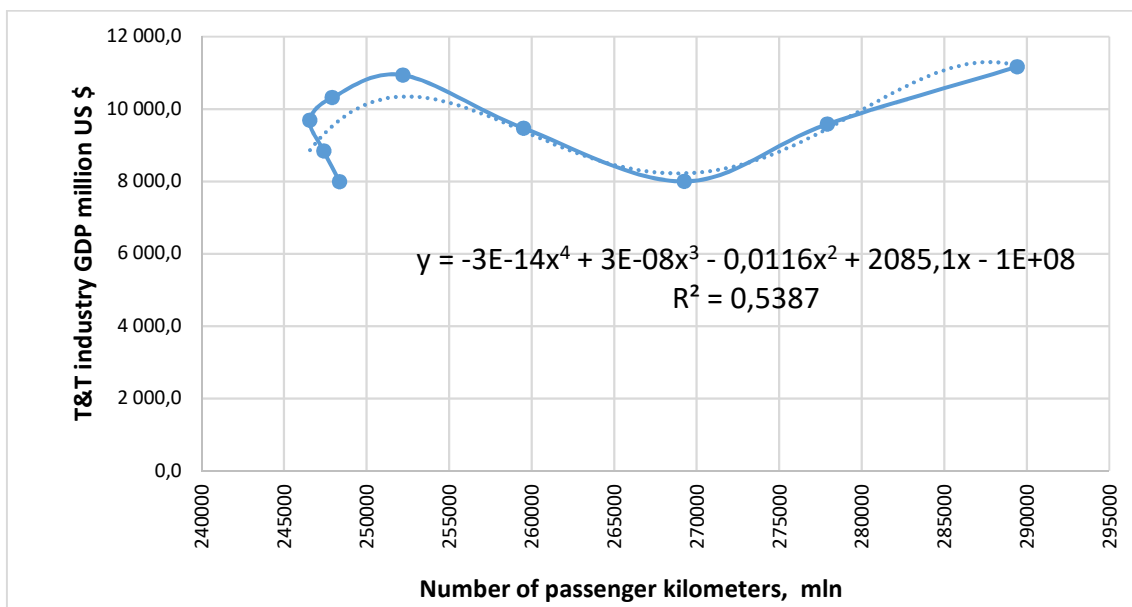
$$y = -3E{-}14x^4 + 3E{-}08x^3 - 0{,}0116x^2 + 2085{,}1x - 1E{+}08$$
$$R^2 = 0{,}5387$$

Source: own study, based on The European Union Open Data Portal (2021), World Economic Forum (2011-2019)

Ukraine is in a different situation (Fig. 9). The country has a low passenger flow on domestic transport and demonstrates the growth of domestic transport of passengers;

however, even given these predispositions, tourist activity is declining. Nonetheless, with large values of the first indicator, the number of tourist trips increases, i.e. there exists a correlation at high values of domestic transport of passengers, which is similar to the situation in Poland. This trend is related to the fact that tourists in Ukraine mostly choose long trips. These options seem to be more interesting for Ukrainians. They state that, in case of short distances, they can explore the region either during business trips, or while visiting close relatives. With that, the dependence curve is close to the curve of the fourth-degree polynomial with an acceptable value of $R^2=0.9581$, which indicates a high accuracy of the approximation.

**Figure 9.** Dependence of Tourism on Domestic Transport of Passengers in Ukraine

$$y = -1E\text{-}09x^3 + 0{,}000x^2 - 85{,}63x + 6E\text{+}06$$
$$R^2 = 0.958$$

Source: own study, based on The European Union Open Data Portal (2021), World Economic Forum (2011-2019)

In the United States, the sector has the same features. From our perspective, this can be explained by the same arguments as in Ukraine (Fig. 10). The approximation also occurs by the fourth-degree polynomial. In this case, we have a high value of $R^2=0.9748$.

Figure 10. Dependence of Tourism on Domestic Transport of Passengers in the USA
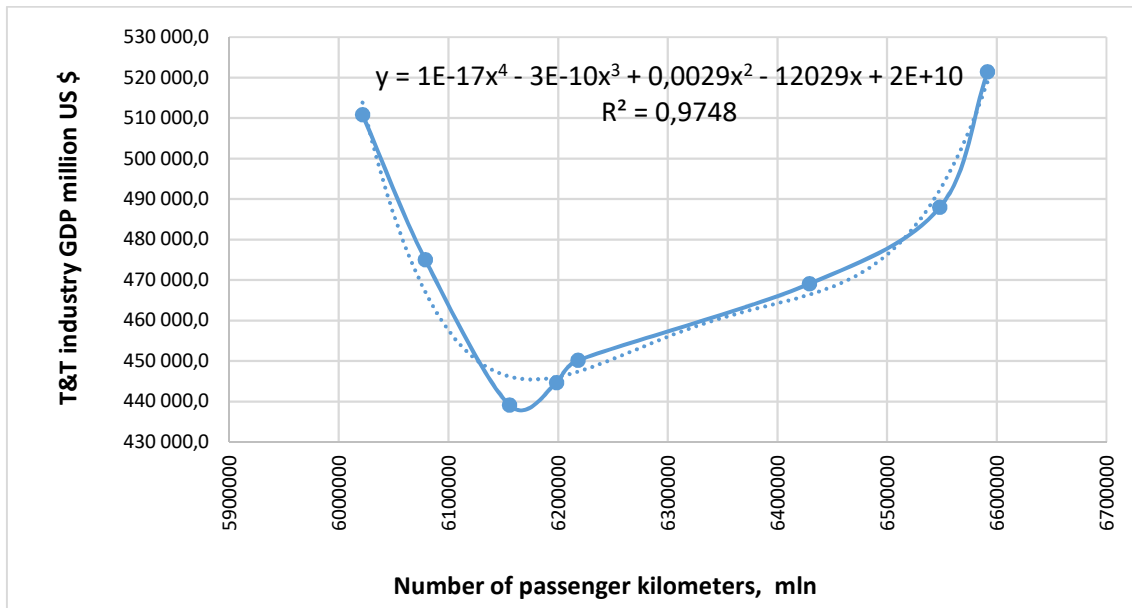
$$y = 1E\text{-}17x^4 - 3E\text{-}10x^3 + 0,0029x^2 - 12029x + 2E\text{+}10$$
$$R^2 = 0,9748$$

Source: own study, based on The European Union Open Data Portal (2021), World Economfic Forum (2011-2019)

In China, there is actually no link between domestic transport and tourism (Fig. 11). We theorize that this is mainly due to the fact that the vast majority of the Chinese prefer tourist trips abroad due to the growth of their wealth (Kaigorodovaet. al., 2018). Moreover, if we analyse the geographical location of UNESCO World Heritage Historical and Cultural Sites in China, we can see that out of the 52 monuments, only 8 are located in the remote north-western provinces of the country, while 44 are closely located on Southeast of the country.

Figure 11. Dependence of Tourism on Domestic Transport of Passengers in China
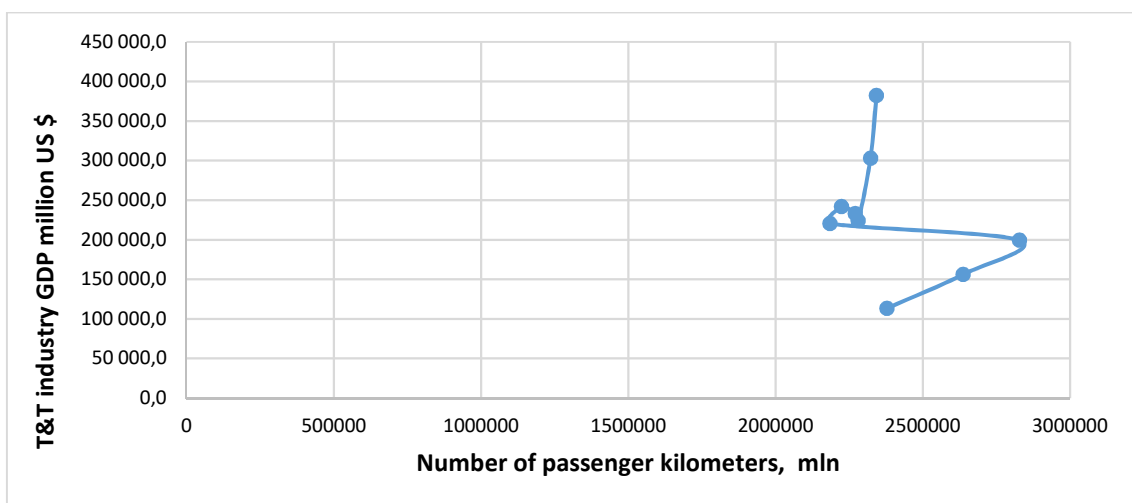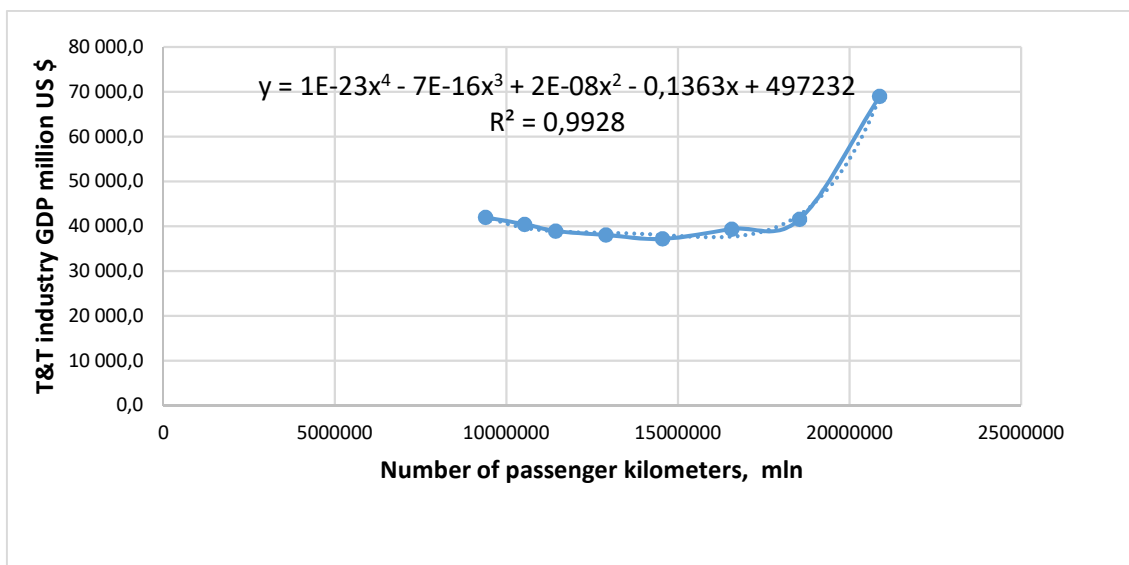

Source: own study, based on The European Union Open Data Portal (2021), World Economic Forum (2011-2019)

In India, the situation is similar to Ukraine, the United States and Poland (Fig. 12). As in the aforementioned countries, at low values of passenger-distance (km), there is a slight decline in tourism sector with increasing passenger flow. Nevertheless, at its large values there is a noticeable increase. The study can provide the same explanation as for the stated countries. The approximation of the fourth-degree polynomial is acceptable, since R2=0.9928 is very substantial.

Hence, the tourism dynamics in Poland and Ukraine have a similar interdependence. The countries develop transport infrastructure and continue to form the legislative field for the development of the transport industry. The processes of transport infrastructure development and the dynamics of the transport of passengers are similar to the noted processes in such countries as the United States and India. The transport infrastructure development and the volume of the transport of passengers greatly affect the structure and capacity of the tourism industry.

Figure. 12. Dependence of Tourism on Domestic Transport of Passengers in India

$$y = 1E\text{-}23x^4 - 7E\text{-}16x^3 + 2E\text{-}08x^2 - 0{,}1363x + 497232$$
$$R^2 = 0{,}9928$$

Source: own study, based on The European Union Open Data Portal (2021), World Economic Forum (2011-2019)

As opposed to these countries, China has its own representation of dependencies. The reasons for this phenomenon include the following: China has developed state regulation of the national economy, as officially the People's Republic of China calls its system "building socialism with Chinese characteristics", the peculiarities of the location of historical and cultural sites in the country, distinctiveness of the distribution and methods of overcoming COVID-19, and the areas of cooperation between transport corporations and the state.

Summary

The analysis of the forecast of the dynamics of domestic transport of passengers in comparison with the dynamics of GDP per capita and the CPI allows us to state that in the next 5 years the economies Poland, China and India will expand (there will be GDP per capita growth) for each of the projected scenarios (realistic, optimistic and pessimistic). According to the study, the only exception is Ukraine, where this figure will be 95-96% depending on the selected scenario. The conducted research shows that from 2021 to 2025 the projected GDP per capita growth in Poland will amount to 12.03%. According to the realistic forecast, this will affect the increase in domestic transport of passengers, which will amount to 120.8% with a decrease in the CPI to the level of 32.8%. The United States and India will demonstrate similar patterns. Particularly, the projected GDP per capita growth in the US will amount to 106.1%, while domestic transport of passengers will be equal to 108.9% and the CPI will fall to 86.8%. At the same time, in India the GDP per capita is expected at 118.7%, with domestic transport of passengers amounting to 169.4% and the CPI to 57.6%. It is worth stressing that among these three countries, India has the largest volume of domestic passenger traffic, with a growing GDP per capita. In China, the forecast is also curious, i.e. in the next 5 years the country will have a growing GDP per capita at 123.5%, domestic transport of passengers is expected to decrease to 90.6% with the CPI equal to 73.0%. In this regard, Ukraine will be the country with the bleakest future, as in 2025 GDP per capita is expected to be 96.2% compared to the figure in 2021. At the same time, domestic transport of passengers is estimated at 47.4% of the 2021 level and the CPI is expected to grow by 0.4% compared to 2021. Hence, the analysed indicators suggest that the economic situation in Poland, USA and India will facilitate the transport industry development in the subsequent 5 years.

Our extensive study of the closeness of the connection between the transport and tourism industries in 2010 – 2018 showed that in Ukraine, the USA and India there is a close association in the form of the fourth-degree polynomial between tourism and domestic transport of passengers (for Ukraine $y = 1E-15x^4 - 1E-09x^3 + 0.0005x^2 - 85.635x + 6E+06$ at $R^2 = 0.9581$; for the USA $y = 1E-17x^4 - 3E-10x^3 + 0.0029x^2 - 12,029x + 2E+10$ at $R^2 = 0.9748$; for India $y = 1E-23x^4 - 7E-16x^3 + 2E-08x^2 - 0.1363x + 497,232$ at $R^2 = 0.9928$). In each of the aforementioned countries, the coefficient of determination is $R^2 > 0.9$. In Poland, the quartic polynomial between tourism and domestic transport of passengers is expressed by the

equation $y = -3E-14x^4 + 3E-08x^3 – 0.0116x^2 + 2,085.1x - 1E+08$ at $R^2 = 0.5387$, which indicates the absence of close link between the transport and tourism industries in this country. As a matter of fact, in China, there is no particular dependence between the aforesaid considered indicators.

Our study suggests that the United States and India have the best prospects for transport and tourism industries. In these countries rather than elsewhere, the carriers can count on the successful course of the international passenger traffic development. Notwithstanding the positive forecasts for the transport industry development in Poland, there is a rather weak link between the transport and tourism industries. Consequently, we cannot expect an active development of international passenger traffic here. Ukraine is surely deprived of such prospects due to the pessimistic forecast data on GDP per capita and domestic transport of passengers. In turn, China cannot count on the successful development of international passenger traffic due to the declining domestic passenger traffic and the lack of interdependence between tourism and domestic transport of passengers.

Needless to say that, given the COVID-19 pandemic, these relationships may be weakened for some time. Nevertheless, this is not the first time that the global economy has faced crises or recessions. Every time the world economy struggled and it was eventually able to overcome the crisis, even though it took years afterwards to re-establish previously identified interdependencies at a slightly different level. We believe that further research should focus precisely on this aspect.

References

ADLER, N., BRUDNER, A., PROOST, S., (2021) .A review of transport market modeling using game-theoretic principles, European Journal of Operational Research, Vol. 291, Issue 3, 808-829,

BEZERRA, G., GOMES, C., (2019). Determinants of passenger loyalty in multi-airport regions: Implications for tourism destination, Tourism Management Perspectives, 31, 145–158.

BORKOWSKI, P., JAŻDŻEWSKA-GUTTA, M., SZMELTER-JAROSZ, A., (2021). Lockdowned: everyday mobility changes in response to COVID-19, Journal of Transport Geography, Vol. 90, 102906.

CUIA, Q, HEA, L., LIUB, Y., ZHENGA, Y., WEID, W., YANGE, B., ZHOUF, M., (2021). The impacts of COVID-19 pandemic on transport sectors based on the CGE model coupled with a decomposition analysis approach, Transport Policy, Vol 103, 103–115.

ERIK, A., ISAK, R., MATEJ, C., ERIK, J., (2021). Who continued travelling by public transport during COVID-19? Socioeconomic factors explaining travel behaviour in Stockholm 2020 based on smart card data. European Transport Research Review, 13(1).

INAN, A., TOLGA, T., GÖKMEN, R., (2021). The Determination of the Factors Affecting Air Transportation Passenger Numbers, International Journal of Aviation, Aeronautics, and Aerospace, 8(1), 4.

KAIGORODOVA, G., ALYAKINA, D., PYRKOVA, G., MUSTAFINA, A., TRYNCHUK, V., (2018). Investment activity of insurers and the state economic growth, Montenegrin Journal of Economics, 14(4), 109-123.

KAUL, R.N. (1985). Dynamics of tourism: a trilogy. Vol. III: Transportation and marketing. New Delhi: Sterling.

KHADAROO, J., SEETANAH, B., (2007). Transport infrastructure and tourism development, Annals of tourism research, 34(4), 1021-1032.

KHADAROO, J., SEETANAH, B., (2008). The role of transport infrastructure in international tourism development: A gravity model approach, Tourism management, 29(5), 831-840.

KHAN, S., QIANLI, D., SONGBO, W., ZAMAN, K., ZHANG, Y., (2017). Travel and tourism competitiveness index: The impact of air transportation, railways transportation, travel and transport serviceson international inbound and outbound tourism, Journal of Air Transport Management, 58, 125-134.

KLAPKIV, Y., VOVK, V., KLAPKIV, L. (2020). Comparative Analysis of the Health Care Institutions' Competitiveness Level, Montenegrin Journal of Economics, 16(3), 69-82.

KOZIUK, V., HAYDA, Y., DLUHOPOLSKYI, O., KLAPKIV, Y., (2019). Stringency of Environmental Regulations vs Global Competitiveness: Empirical Analysis, Economics & Sociology, Vol. 12 (4), 264-284.

KUMAR, A., (2021). Transition management theory-based policy framework for analyzing environmentally responsible freight transport practices, Journal of Cleaner Production, Volume 294.

LIU, Z., (2003). Sustainable tourism development: A critique, Journal of Sustainable Tourism, 11(6), 459-475.

Ministry of Infrastructure of Ukraine (2021), In 2020, Ukrzaliznytsia passengers purchased 66% of their tickets online [Passazhyry Ukrzaliznytsi u 2020 rotsi 66% kvytkiv prydbaly onlain], URL: https://mtu.gov.ua/news/32560.html (access: 23.01.2021), [in Ukrainian].

MOTOWIDLAK, U., (2017). Transport development and the paradigm of sustainable development [Rozwój transportu a paradygmat zrównoważonego rozwoju], Economic Studies, Scientific Papers of the University of Economics in Katowice, Vol. 337,138-152, [in Polish].

PUCHONGKAWARIN, C., RANSIKARBUM, K., (2020). An Integrative Decision Support System for Improving Tourism Logistics and Public Transportation in Thailand, Tourism Planning & Development, 1-16. DOI: 10.1080/21568316.2020.1837229

PwC, (2019). Transport of the Future: Reporton Prospectsof Road Transport Developmentin Poland 2020-2030, [Transport przyszłości. Raport o perspektywach rozwoju transportu drogowego w Polsce w latach 2020-2030], URL: https://tlp.org.pl/ (access: 10.02.2021), [in Polish].

Resolution of the Cabinet of Ministers of Ukraine No. 180 dated February 7, 2018, "On Amendments to the Tender Procedure for Passenger Transportation on a Public Bus Route", URL: https://mtu.gov.ua (access: 11.01.2021).

The European Union Open Data Portal, (2021), URL: https://stats.oecd.org(access: 3.01.2021).

The World Bank, (2021). World Development Indicators, URL: www.databank.worldbank.org (access: 1.07.2021)

Trading Economics, (2021a). GDP Growth Rate, URL: https://tradingeconomics.com/ (access: 10.02.2021).

Trading Economics, (2021b). Consumer Price Index (CPI), URL: https://tradingeconomics.com/ (access: 10.02.2021).

European Commission, Directorate-General for Mobility and Transport, (2019). Transport in the European Union – Current Trends and Issues, URL:https://ec.europa.eu/transport/sites/default/files/2019-transport-in-the-eu-current-trends-and-issues.pdf(access: 10.02.2021).

UNCTAD, (2016). Handbook of Statistics, URL: http://unctad.org/en/Pages/statistics.aspx (access: 30.01.2020).

VOVK, V., LEVITSKA, S., ŁUKASIK, A., OSTROWSKI, J., GAWĘDA, K., (2018). Competitiveness of Health Facilities – Accounting and Analytical Approach, Medycyna ogólna I nauki o zdrowiu, 24(3): 176–183, DOI: 10.26444/monz/95135

World Economic Forum, (2011). The Travel & Tourism Competitiveness Report 2011, URL: http://www3.weforum.org/docs/TTCR11/ (access: 3.11.2020).

World Economic Forum, (2013). The Travel & Tourism Competitiveness Report 2013, URL: http://www3.weforum.org/docs/WEF_TT_Competitiveness_Report_2013.pdf (access: 3.11.2020).

World Economic Forum, (2015). The Travel & Tourism Competitiveness Report 2015, URL: http://www3.weforum.org/docs/TT15/WEF_Global_Travel&Tourism_Report_2015.pdf (access: 3.11.2020).

World Economic Forum, (2017). The Travel & Tourism Competitiveness Report 2017, URL: https://www.weforum.org/reports/the-travel-tourism-competitiveness-report-2017 (access: 3.11.2020).

World Economic Forum, (2019). The Travel & Tourism Competitiveness Report 2019, URL: https://www.weforum.org/reports/the-travel-tourism-competitiveness-report-2019 (access: 3.11.2020).

Xiuting, W, (2006). Analysis of the relations between road passenger transportation enterprises and tourism and its developing mode, Proceedings of the 3rd International Conference on Innovation & Management, Vol 1, 16-19.