

# “Trends of air transportation market development in Ukraine”

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# TRENDS OF AIR TRANSPORTATION MARKET DEVELOPMENT IN UKRAINE

## Abstract

To identify the trends of air transportation market development in Ukraine during the period 2010–2018, the analysis of the riskiness of the external market environment of airlines being the major market actors and main factors, which influence the air transportation market development, were made in the paper using statistical methods and methods of probability theory. The working hypothesis was proved on corresponding the main trends of air transportation market development in Ukraine with the world ones and the very high riskiness of the external environment of the airlines. There is some local specifics of the air transportation market in Ukraine connected with the armed conflict at the East of the country, a significant impact of non-economic factors in some years, and implementation of international safety standards. The COVID-19 impact is considered only as a discussion question. The originality of the paper is in discussing the modern trends of air transportation market development in Ukraine in the context of considering the interaction "subject – poly-subject environment". The airlines are considered as the subjects that interact with a market as an external poly-subject environment. The results of the research identified that the riskiness of the external market environment is at the critical level for the majority of the studied airlines that does not contribute to successful business activity in Ukraine. European and Ukrainian official authorities can use the obtained results during the development and implementation of the joined cooperation in the sphere of air transportation. Besides, in the context of COVID-19, the trends of improving aviation safety and satisfying international standards are becoming increasingly important for airlines as well as for state authorities in developing the appropriate state policy.

## Keywords

air transportation, market, development, external environment, Ukraine

## JEL Classification

R41, O52, F64, L10

## INTRODUCTION

The global air transportation market before COVID-19 crisis has been characterized by an increase in the level of globalization, integration, and digitization. This has been reflected in the activities of global airline alliances, the emergence of new forms of economic relations between different actors in the air transportation market, the creation of a common information space for interacting participants, the expansion of the range of services and scope of international reservation systems and sales of transportation, etc. However, at the same time, threats of loss of national markets at the expense of active penetration of transnational and low-budget foreign airlines has been increasing.

The operation of aviation highly depends on compliance with safety standards and efficient operations provided by highly skilled workers. Therefore, the cooperation of the leading international aviation organizations IATA (International Air Transport Association) and ICAO (International Civil Aviation Organization) in the field of human capital of air transportation aims to establish strong standards of training and development of competencies for non-accredited professionals, as

well as to improve the professional level of mastering modern technologies of working professionals, which is largely related to the need to meet international aviation security standards.

World experience shows that in today's environment, those airlines that survive in their policy of targeting existing customers keep operating. The implementation of this policy implies the modification and expansion of a set of customer-oriented services.

The development of a new market or the introduction of a new service requires the airline to use an appropriate model of segmentation of consumers of air transportation services, within which certain segment and sub-segment groups that are characteristic of the given market are allocated. It allows to study consumer groups in an extended format and, in the future, to form customer-oriented approaches when implementing air transportation services within the loyalty program. A common vector for the operation of airlines, through which the organization itself and each of its customers can emphasize their importance in society, is the implementation of the concept of social responsibility.

The state of development of the air transportation market significantly influences all management processes occurring at air transportation enterprises, including strategic human capital management. The Ukrainian air transportation market has experienced several adverse shocks over the last ten years, such as: the economic crisis of 2008–2009; bankruptcy of leading airlines in 2013; hostilities in Eastern Ukraine, which began in 2014 and continue today due to the COVID-19 crisis.

The processes that take place in the external market environment of airlines today greatly increase the riskiness of their operations, test them for the ability to adapt to those factors of the development of the air transportation market that airlines are not able to control. This research reflects the actual situation on the air transportation market in Ukraine at a time when this market is no longer the one that was before COVID-19, but not yet enough statistics to reveal the real impact of the pandemic for it.

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## 1. LITERATURE REVIEW

An air transportation enterprise is an open social and economic system. Its development depends on the impact of external environment. Accordingly, the interaction takes place “subject – poly-subject environment”, in which the enterprise acts as such a subject, and the poly-subject environment may change depending on the object of the research (Shkoda, 2018). The term “the poly-subject environment” in the context of the scientific research is more closely investigated in the publications of Lepsky (2008) and Stiopin (2003). That is, if the object of this research is the trends of air transportation market development, then such a poly-subject environment for airlines is the air transportation market.

There are two important elements of the air transportation external environment: common external environment and the branch-specific one. In the whole world, the functioning and challenging market realities of airlines depend very much on

common external environmental changes (e.g., terroristic attacks, COVID-19, strengthened travel security, prices on fuel, technological improvements, etc.), as well as on changes in the branch specific environment (e.g., entry of low-cost carriers, competition at the global market, formulation of strategic aviation alliances, etc.) (Joo & Fowler, 2014).

The air transportation market researchers pay much attention to key drivers of air transportation business efficiency. Some researches are dedicated to service quality management. And it is noted (Tiernan, Rhoades, & Waguespack Jr, 2008) that the EU perception scores of airlines services quality are higher in common than those in the USA, reflecting a better situation in this branch. At the same time, other research (Joo & Fowler, 2014) showed that the airlines in Europe had lower effectiveness than airlines in such continents as Asia and North America by such operating efficiency indicators as revenue and expenses. It is also defined in other research (Lopes, Pitta Ferraz,

& Gomes Rodrigues, 2016) that turnover of the top 30 major airlines worldwide is driven by the factors of human and structural capital, namely employee expenses and benefits; directors' board's size; intangible assets; codeshare contracts; and traffic of passengers. They also proved that there is no regional dependency in airlines profitability, capital ownership, and control or integration into the strategic aviation alliance. It should be noted that these authors (Lopes, Pitta Ferraz & Gomes Rodrigues, 2016) have not considered airlines service quality as one of profitability drivers.

Special interest of researchers is directed to the aviation security issues (Jackson, LaTourrette, Chan, Lundberg, Morral, & Frelinger, 2012; Gillen & Morrison, 2015) as an urgent modern challenge of air transportation market. Tools and approaches to developing efficient security strategies and implementing tactics were analyzed and presented to ensure aviation security in the USA and receive the best results (Jackson et al., 2012). Gillen and Morrison (2015) made an overview of economic issues connected with costing, pricing, financing, and performance of aviation security, especially in the context of growing costs of aviation security for the period 2001–2015. It is necessary to highlight that this trend has been deepened in the air transportation market development before the COVID-19 crisis.

Yazgan (2018) considers aviation security as an element of social responsibility or some of its components, such as corporate sustainability, etc. He believes that corporate sustainability can be accomplished via supporting workforce, which is the human risk factor. Here can be found the intersection of the social responsibility concept and air transportation. Such intersection was investigated in more detail in the research of Lee, Kim, and Ham (2018), where they have found that corporate social responsibility has direct relationship with airline's type and economic conditions.

Küçükönel and Sedefoğlu (2017) paid attention to the interrelation between air transportation growth and impact of socio-economic factors on it. They found the unidirectional short-run causal relationship between economic growth, tourism, employment, and air transportation. Dimitriou and Sartzetaki (2018) obtained very similar results

in the context of the tourism and air transportation relationship.

The regional specifics of the air transportation market in Ukraine is presented in publications of Kulayev and Shchelkunov (2010), Zhavoronkova, Sadlovska, Shkoda, and Zhavoronkov (2012), Oleshko and Heiets (2018), Dorofeeva (2015), Shkoda (2018), Malahivska (2019), etc.

Dorofeeva (2015) considered perspectives of the Ukrainian integration to the European airspace and joining it to the EU aviation network in the conditions of globalization. Shkoda (2018) paid attention to globalization in the context of strategic human capital management of air transportation enterprises in Ukraine. Oleshko and Heiets (2018) and Malahivska (2019) made the statistical analysis of the current state of the air transportation market in Ukraine by paying more attention to the impact of economic factor. The influence of globalization on transport development is also considered by the researchers of the other types of transport (Savych, 2018; Ilnytsky, Zinchenko, Savych, & Yanchevskyy, 2018).

The analysis of the above publications and comprehensive studies on the problems of air transportation in Ukraine (Kulayev & Shchelkunov, 2010; Zhavoronkova, Sadlovska, Shkoda, & Zhavoronkov, 2012; Shkoda, 2018) showed that the most important factors that influence the development of air transportation in the country and determine the main trends of market development should include the following: 1) economic factor (GDP, tourist flow); 2) demographic (urbanization) factor; 3) globalization; 4) liberalization; 5) human factor; 6) information and technical factor.

Thus, this research aims to identify current trends of air transportation market development in Ukraine based on the analysis of the external environmental risks of airlines as major market actors and main factors influencing the air transportation market development.

The working hypothesis of the research is the assumption that the main trends of air transportation market development in Ukraine correspond to the world ones, but the riskiness of the external environment of the airlines is very high.

## 2. DATA AND METHODS

The research of determining the modern trends of air transportation market development in Ukraine was conducted based on available official data of the State Aviation Service of Ukraine (SASU, 2019), SE “Information and Analytical Agency” (IAA, 2019), the Stock Market Infrastructure Development Agency of Ukraine (SMIDA, 2019) for 2010–2018 for 12 airlines in Ukraine.

Data on passenger air transportation (HCDCS 51.10) and cargo air transportation (HCDCS 51.21) of Ukraine were taken in accordance with the HCDCS (Harmonized Commodity Description and Coding System) (HCDCS, 2019).

During the research, statistical methods were used to analyze the dynamics of passenger and cargo air transportation by airlines in Ukraine, aviation events in Ukraine, and the riskiness of external environment of Ukrainian airlines as a significant indicator of the airline’s development.

A quantitative risk analysis enables to determine the degree of risk of a particular business entity or particular economic activity as a whole. Such analysis is based on the methods of probability theory and mathematical statistics. The probability of loss from risk is one of the main parameters of quantitative analysis of risk assessment. However, the greater the risk, the greater the probability of realization of the risk and the amount of possible losses.

The following statistics are used in the research to carry out probabilistic risk assessment (Goltiaieva, 2015):

1. Dispersion  $D(X)$  (the greater is the risk, the greater is the value of this numerical characteristic):

$$D(X) = \sum p_i \left( x_i - \bar{X} \right)^2, \quad (1)$$

where  $p_i$  – probability of occurrence of a random variable,  $x_i$  – the value of a random variable,  $\bar{X}$  – the average value of a random variable.

2. Standard deviation  $\delta$  (the economic decision is the more risky, the greater is the value of this numerical characteristic):

$$\delta = \sqrt{D(X)}. \quad (2)$$

3. Coefficient of variation  $\gamma$  (the degree of risk is less and the predicted situation is the more stable, the smaller is the value of this indicator):

$$\gamma = \frac{\delta}{\bar{X}}. \quad (3)$$

The research is limited by the available statistical information of the Ukrainian airlines. That is why the research covers the period 2010–2018. Microsoft Excel program is used for making all calculations.

The method of analytical aligning with the elements of correlation and regression analysis is used as primary method to process data and calculate the relationship between GDP per capita growth (%) and the growth of the transported passengers volume by airlines in Ukraine (%). The trend model is considered adequate to the process under study and reflects the trend of its development over time with  $R^2$  value close to 1. The trend model with the highest coefficient of determination is the most appropriate for each estimated dependence.

The correlation coefficient is also determined, which enables to measure statistical dependence (the level of influence of argument  $x$  on function  $y$ ). The conclusion is reached about the presence of stochastic dependence if the correlation coefficient is from  $\pm 0.5$  to  $\pm 0.7$  – average or from  $\pm 0.7$  to  $\pm 1$  – strong.

Therefore, the methodology of this research is a specific activity system that includes categories and theories of the air transportation market development, as well as statistical methods and the methods of probability theory, the specific purpose of which is to identify the main trends in the development of this market.

## 3. RESULTS

### 3.1. Riskiness of external environment of Ukrainian airlines

Riskiness of the external environment is an important indicator of evaluating market conditions. Besides, an enterprise’s risk environment is a set of

**Table 1.** Profitability (loss) of sales of Ukrainian airlines in 2010–2018

Source: Constructed by the authors based on IAA (2019), SMIDA (2019).

Airline	2010	2011	2012	2013	2014	2015	2016	2017	2018
Artem-Avia	0.21	0.05	-0.20	0.58	0.31	0.25	0.03	0.02	-0.03
Airlines of Kharkiv	-1.25	-0.75	-1.14	-0.05	-0.16	-1.30	-0.25	-0.25	-0.26
Bukovyna	0.02	0.20	-1.19	-0.55	-5.28	-8.32	-4.70	-3.78	0.53
Gorlytsia	-0.04	-0.03	-0.55	-0.17	-18.12	-0.88	-0.68	-0.52	-0.33
Dniproavia	-0.24	-0.39	-1.27	-2.17	-2.74	-2.24	-0.97	-1.58	1.45
Columbus	-0.07	0.00	-0.01	-0.0001	-0.93	-0.66	0.22	0.10	0.19
Constanta	-0.02	-0.08	0.02	-0.03	-0.96	-1.33	-1.64	-0.39	-2.28
UIA	-0.08	-0.14	0.01	0.003	-0.25	-0.04	0.02	-0.01	-0.10
Spets-Avia	-1.01	-1.01	-0.03	-0.12	-0.03	0.03	0.08	-0.03	0.01
Ukraine-Aeroalliance	0.02	0.07	0.10	0.09	0.04	0.03	0.02	0.03	0.04
Ukrainian Helicopters	-0.01	0.01	0.01	0.0001	-0.15	-0.07	0.12	0.01	0.06
URGA	0.19	0.12	0.09	-0.06	0.02	0.03	0.05	0.01	0.01
HCDCS 51.10	-0.11	-0.18	-0.08	-0.13	-0.43	-0.35	-0.30	-0.33	-0.36
HCDCS 51.21	0.03	0.06	0.02	0.01	0.005	-0.0003	-0.003	-0.02	-0.03
HCDCS 51.10 and 51.21	-0.08	-0.13	-0.08	-0.10	-0.32	-0.28	-0.24	-0.27	-0.29

objects and processes of the external environment that serve as sources of risk.

The level of profitability (loss) of sales is one of the main indicators that characterize the effectiveness of the enterprise and the implementation of its general development strategy. The positive value of the profitability indicator over a long period indicates a stable performance of the enterprise. The negative value of this indicator indicates the inefficiency of the enterprise. Table 1 shows the level of profitability (loss) of sales of Ukrainian airlines (12 airlines, separately passenger air transportation (HCDCS 51.10), separately cargo air trans-

portation (HCDCS 51.21), and together passenger and cargo air transportation (HCDCS 51.10 and 51.21)). It should be noted that according to this indicator, the most effective is the activity of Ukraine-Aeroalliance Airlines.

The estimated values of the statistical indicators for assessing the riskiness of the market environment for airlines in Ukraine and interpreting their risk degree based on the values of the coefficient of variation are shown in Table 2.

The following estimate of the coefficient of variation is generally accepted (Ivchenko, 2007): up

**Table 2.** Risk assessment statistics for Ukrainian airlines in 2010–2018

Source: Constructed by the authors.

Airline	Average value $\bar{X}$ , %	Dispersion $D(X)$	Standard deviation $\delta$	Coefficient of variation $\gamma$ , %	Riskiness of market environment
Artem-Avia	0.13	0.0527	0.2295	170.23	Critical
Airlines of Kharkiv	-0.60	0.2612	0.5111	-85.08	High
Bukovyna	-2.56	9.5574	3.0915	-120.61	Critical
Gorlytsia	-2.37	34.9782	5.9142	-249.59	Critical
Dniproavia	-1.13	1.6440	1.2822	-113.69	Critical
Columbus	-0.13	0.1561	0.3951	-309.90	Critical
Constanta	-0.75	0.7204	0.8488	-113.76	Critical
UIA	-0.07	0.0078	0.0883	-134.34	Critical
Spets-Avia	-0.23	0.1958	0.4425	-189.62	Critical
Ukraine-Aeroalliance	0.05	0.0010	0.0311	63.77	High
Ukrainian Helicopters	-0.003	0.0057	0.0757	-2718.98	Critical
URGA	0.05	0.0052	0.0719	142.18	Critical
HCDCS 51.10	-0.25	0.0161	0.1270	-50.42	High
HCDCS 51.21	0.01	0.0007	0.0266	285.49	Critical
HCDCS 51.10 and 51.21	-0.20	0.0100	0.1002	-49.91	High

to 10% are weak fluctuations; 10-25% – moderated fluctuations; more than 25% – high fluctuations. The greater is the risk, the higher are the fluctuations.

It should be noted that for only 2 out of 12 analyzed Ukrainian airlines during the period 2010–2018, the riskiness of the market environment is high, for all others, it is critical.

According to the results of the analysis in the context of economic activities, it is established that for the passenger air transportation (HCDCS 51.10), the riskiness of the market environment is high, and for the cargo air transportation (HCDCS 51.21) – critical. However, if the passenger and cargo air transportations are analyzed together, the general riskiness of the market environment is high. Thus, in the context of the general development strategy, strategic management decision made by aviation companies in Ukraine is of high risk, and for most individual airlines, it is critically risky.

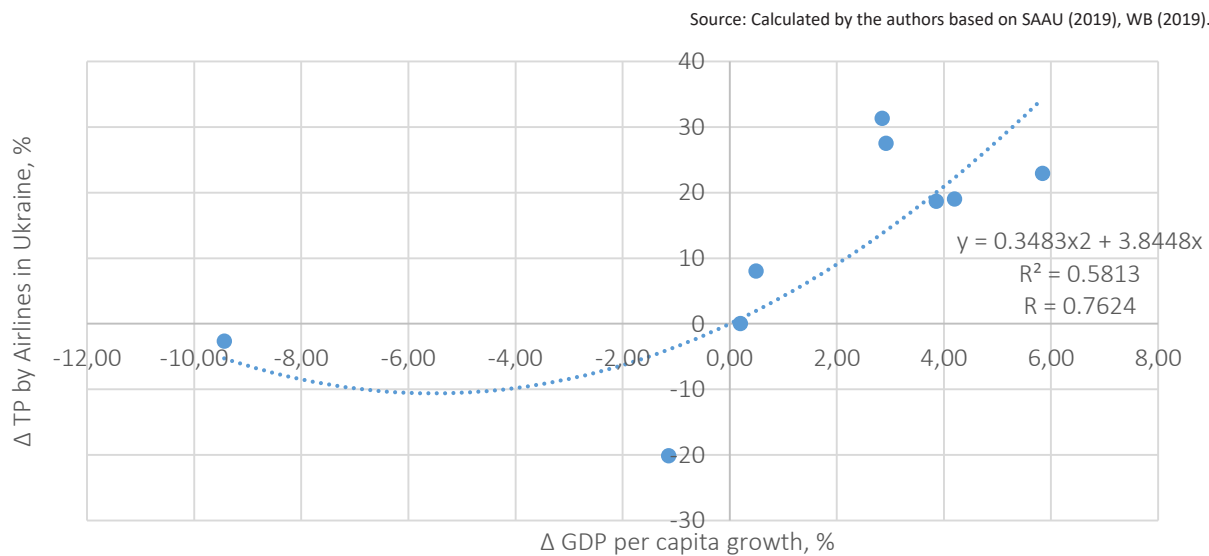
### 3.2. Factors influencing the air transportation market development in Ukraine

The economic situation directly affects air transportation. Globally, there is a fairly stable correlation between GDP dynamics and the development of air transportation services. Growth in air trans-

portation usually exceeds GDP per capita growth by 1-2 points. The relationship between GDP per capita growth (%) in Ukraine and the passenger air transportation made by airlines in Ukraine is presented in Figure 1.

The analysis confirms that the relationship between the transported passengers by airlines in Ukraine and the GDP per capita growth in Ukraine is quite stable. The determination coefficient for the dependence is  $R^2 = 0.5813$  and the correlation is  $R = 0.7624$ , which proves that this dependence has a high correlation. The trend model is polynomial in the analyzed case. The presence of polynomial dependence (Figure 1) indicates the development with a constant acceleration. This is evidenced by the positive value of the coefficient  $a_2$  (0.3483). It also indicates the stimulating effect of the analyzed factor GDP per capita on the increase of the transported passengers by airlines in Ukraine.

While in European countries, the average growth of passenger air transportation is 5-10% (Komarova, 2017), in Ukraine in 2016, the growth was more than 30%. This is explained by the fact that in Europe, unlike Ukraine, there was not such a sharp decline in passenger air transportation in 2014–2015, as in Ukraine due to military action in the Donbas. However, today, Ukraine has the lowest average wage in Europe. Considering the connection between air transportation and tour-



Note: \*TP – transported passengers.

**Figure 1.** The relationship of the passenger transported by airlines in Ukraine and the GDP per capita growth rate of Ukraine during 2010–2018, %

ist flow, the most significant deviation was in 2012, when Ukraine accepted the European Football Championship; therefore, the influx of tourists was influenced not only by solvency.

In general, the EU countries have a higher GDP per capita and, accordingly, a more solvent population, compared to Ukraine, in which the incomes of citizens and, accordingly, the intensity of air transportation are lower.

Under the influence of demographic factor, the level of urbanization becomes more important as urban residents have a higher income and, therefore, use air transportation services more often. The level of urbanization in Ukraine is 69.00% (SSSU, 2018), which is higher than the level of urbanization of Poland by 8.9% (GUSP, 2019). The percentage of the population living in urban agglomerations relative to the total population of the country in Poland is, on average, 13.79% and in Ukraine – 4.49%.

Thus, despite the relatively high level of urbanization in Ukraine as a whole, the percentage of the population living in urban areas is quite low, compared to Poland, this figure is about 2.5 times lower in Ukraine. In the authors' point of view, this is one of the reasons for less intensive development of air transportation in Ukraine compared to Poland under the influence of urbanization.

Increasing the number of cities leads to the formation of aviation "hubs" in them, stimulating the development of both passenger and cargo air transportation. The 26 largest hubs in the world, with a population of more than 10 million people, provide more than 20% of world traffic (IATA, 2011). Ukraine does not have a full-fledged hub in its territory. The most suitable Ukrainian airport for transformation into a full-fledged hub is Boryspil Airport, which is the largest airport in Ukraine and is located near the city of Kyiv (2.8 million inhabitants). Overall, in 2018, 61% of passengers in Ukraine were transported via Boryspil Airport, and 14% of passengers in Ukraine via Zhuliany Airport (Figure 2).

It should also be noted that Boryspil Airport is the base for the leading Ukrainian airlines UIA, which annually transports about 2.5 million pas-

sengers through this airport during the period 2014–2017 (Boryspil Airport, 2017).

Thus, the creation of a full-fledged aviation hub in Ukraine is possible. However, in the authors' point of view, to achieve this goal, aviation infrastructure needs to be improved, possibly using public-private partnership (PPP) technology.

Due to globalization, economic and information integration between states is intensifying, which creates the prerequisites for the growth of international air transportation. Regular flights between Ukraine and the countries of the world during 2018 operated by 10 domestic airlines to 46 countries of the world and 29 foreign airlines to 27 countries of the world, including 5 new ones (SAAU, 2019).

The official ban on air transportation with Russia did not lead to catastrophic consequences. Instead, there was a sharp increase in air travel in 2016, at the expense of domestic passengers, transit passengers, and an increase in passenger transportation to Ukraine. Ukrainian citizens began to travel more actively to Europe, which is in line with the EU Integration Strategy (European Union, 2014). The reason for this is also the introduction of a visa-free regime.

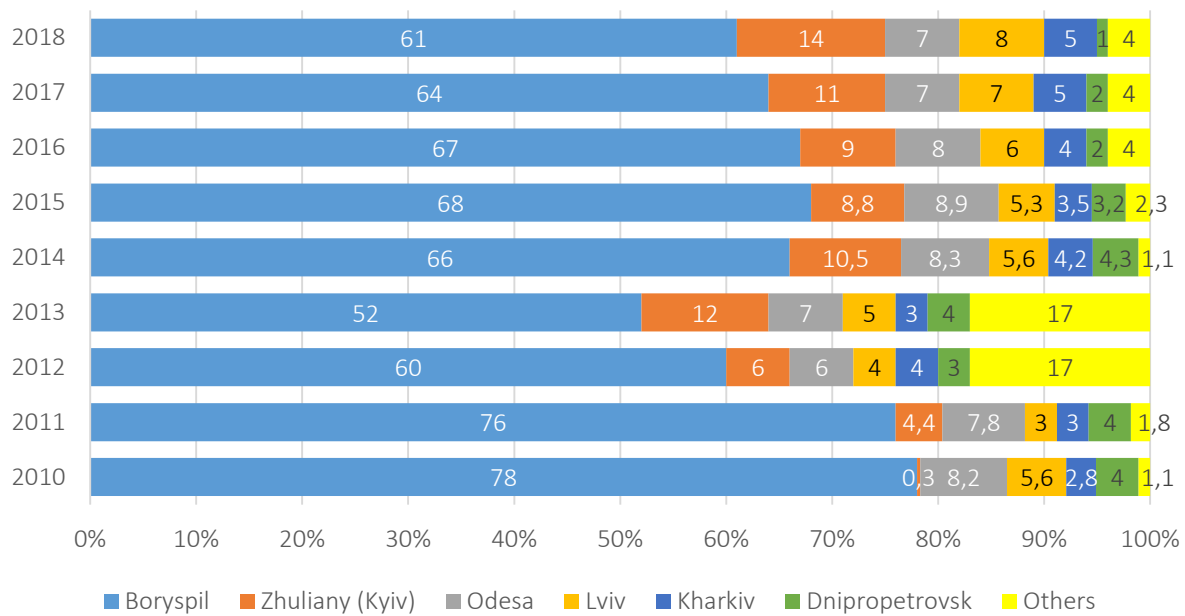
Airlines have made their version of globalization in the form of alliances. Currently, the largest aviation alliances include Star Alliance, One World, and Sky Team. These alliances cover 52 large and medium-sized airlines in the world, which control 60% of passenger air transportation.

In 2007, the Ukrainian Aviation Group, an aviation association, was formed. Around it, an attempt was made to consolidate local airlines. The association controlled 60% of the Ukrainian air transportation market: Dniproavia, AeroSvit (bankrupt in 2013), Donbasaero (bankrupt in 2013) (Shkoda, 2018). The bankruptcy of leading airlines also indicated that there were problems with the management of those airlines.

PJSC UIA is not a member of anyone aviation alliance today but cooperates with individual members of all three alliances that are its code-sharing partners: 1) Sky Team: KLM, Air France,



Source: Own composition based on SAAU (2019).



**Figure 2.** Shares of passengers transported via Ukrainian airports in 2010–2018, %

Alitalia; 2) Star Alliance: Austrian, Swiss, TAP Air Portugal, Adria Airways, Brussels Airlines, BMI; 3) One World: Iberia, Finnair, S7.

Thus, in Ukraine, there is a tendency to establish partnerships under the influence of globalization, but the form of its implementation is different.

Ukraine is not a member of the EU common aviation space, that is, its air transportation market is relatively closed today. Negotiations between Ukraine and the EU on the Common Aviation Area were completed in 2013. However, the signing of this agreement has now been formally blocked due to the conflict between the UK and Spain over the status of Gibraltar airport.

The advantages of a common aviation space for Ukraine include the following ones:

- for passengers – increasing competition between airlines is primarily reflected in lower prices. So, when low-cost airlines started operating in Ukraine (in 2008, Wizz Air), traditional airlines have significantly reduced the price of tickets, at least for a while, and started to open new routes;
- for air transportation enterprises – reorganization and introduction of innovations in the promotion of services.

It is worth noting among the disadvantages of the common aviation space for Ukraine:

- it is detrimental to Ukrainian airlines, especially by reducing the margin by European airlines to Kyiv;
- weak capacity of Ukrainian airlines. The largest Ukrainian airlines have twenty aircrafts on average, which are usually already in use, and the main European players are 300-400, most of which are new.

The current state of Ukraine’s accession to the Common Aviation Area (CAA) and a clear illustration of the impact of the liberalization factor are characterized by several key points:

- solvency of Ukrainian airlines compared to European ones remains low as Ukraine has the lowest average wage in Europe;
- Government adopted in 2017 an Action Plan to prepare for the implementation of the CAA with the EU, which provides for the unilateral implementation of part of the EU directives and regulations;
- Ukraine has already done a great deal to harmonize its legislation with European legis-

lation, but 64 EU regulations and directives have yet to be incorporated;

- UK withdrawal from the EU means that a formal obstacle will be lifted, and CAA Agreement with Ukraine will be signed after completion of the Brexit procedure.

In 2015, Lviv and Odesa airports were announced as “open skies”, although full liberalization of airspace in both cities has not yet taken place. However, in 2016, summer navigation in Lviv showed a significant increase in passenger traffic, and in 2017, it increased by another 50%. In Odesa, passenger traffic increased in 2016, despite the loss of the Russian route, which amounted to 20% of the volume of traffic (Kravchuk & Kulchytska, 2017).

The impact of the human factor on the development of air travel is not straightforward. In the authors’ opinion, this factor is of significant influence in the current conditions of development of civil aviation. In contrast to the demographic factor, the human factor has a greater influence on the quality of the air transportation, because it describes the possibility of a person, for example, in our case, the pilot, to make wrong or similar decisions in specific situations. The term “human factor” is often used to explain catastrophes and accidents that have caused damage or casualties. The increasing in-

fluence of the human factor is related to such a trend in the development of the air transportation market as the improvement of the aviation safety level.

During 2010–2018, there has been seen a relatively positive trend in aviation cases in Ukraine, which is presented in Figure 3.

As can be seen from Figure 3, the most numerous aviation incidents in Ukraine are incidents for the analyzed period. However, it should be noted that there is a positive dynamics of their reduction. The most positive year was 2016 with the fewest incidents during the research period and the complete absence of catastrophes. The total number of all other categories of aviation cases also decreased. However, there is a problem of inability to take into account the statistics of aviation cases that occurred in the territory of the annexed Crimea and temporarily occupied territories of Donetsk and Luhansk regions.

The main factor that caused the dangerous aviation events were human errors, namely incorrect assessment of the situation and untimely actions. That is, it should be noted that the direct impact of the human factor on aviation safety in Ukraine. This confirms the need for systematic measures to reduce aviation security risks associated with human impact.

Source: Own composition based on SAAU (2015), NBAAIU (2016), NBAAIU (2017), NBAAIU (2018).



Figure 3. Dynamics of aviation cases in Ukraine during 2010–2018

According to the Universal Flight Safety Control Audit Program (UFCAP), the overall status of the State Flight Safety Surveillance System in Ukraine in 2017 is in line with the global average (60%), as the level of implementation of world standards in Ukraine is about 57.13% (SAAU, 2018).

However, the above figures are also lower than the 87% level planned for the implementation of ICAO standards in the Industry Flight Safety Program for 2014–2016 (MIU, 2014). As the new Industry Flight Safety Program was not approved, the previously mentioned one has been extended.

To ensure the safety of civil aviation, State Aviation Service of Ukraine, an authorized body for civil aviation issues, undertakes a set of measures aimed at preventing the occurrence of aviation events (SAAU, 2015). They are connected with setting aviation safety criteria and the required level of aviation safety, making analysis, and determining the current level of aviation safety, conducting scheduled and unscheduled audits, monitoring the implementation of corrective actions by aviation entities, cancellation, suspension of certificates, certifications, licenses, permits, restrictions on the rights granted by these documents, withdrawal of approval of applications, etc.

The consistent implementation of the above measures will minimize the risks of air travel related to the impact of human factors and ensure the consistent development of the human capital of air transportation enterprises. In particular, increasing the level of implementation of ICAO standards in Ukraine, especially in the PEL (Personnel Evaluation Licensing) area, is directly related to the effectiveness of the implementation of certificates, certifications, licenses, permits, restrictions on the rights granted by these documents, withdrawal of approval of applications from aviation personnel.

The most powerful ICAO document governing international aviation safety standards is Annex No. 19, "Safety Management", dated November 14, 2013, to the ICAO Chicago Convention (December 7, 1944) (ICAO, 2013), and is the response of the international aviation community to increase the number of aviation accidents and strengthen the terrorist threat.

A characteristic feature of the modern period is that Ukrainian airlines carry out procedures for adapting to the requirements of airlines operating in the global aviation market. Thus, PJSC UIA was the first in the CIS to receive an IOSA (International Operational Safety Audit) certificate and entered the International Aviation Transport Association (IATA) (UIA, 2019).

Air transportation is one of the key strategic sectors of Ukraine's economy. However, at present, Ukraine's air transportation is influenced by the growing manifestations of the systemic crisis of the country's economy and is characterized by high risk.

## 4. DISCUSSION

The most discussed trend of air transportation market development in Ukraine before the COVID-19 crisis is increasing aviation security, which is also influenced by the information and technology factor. On the one hand, a lack of information can lead to an intensification of the negative impact of the human factor when making a decision in an extreme situation, and, on the other hand, the technical disadvantages of aircraft designs also threaten the safety of air transportation. According to the Civil Aircraft Register of Ukraine (SAAU, 2020), a total of 1,006 civil aircraft of various manufacturers are registered in Ukraine. For example, PJSC UIA has about 39 vehicles from leading aircraft manufacturers Boeing (USA) and Embraer (Brazil), most of which are leased (38 units out of 39 available aircraft). Slightly better situation at the airline URGA, which has 7 own planes and 7 leased ones. At the same time, some airlines in Ukraine have all the aircrafts in their ownership: for example, all 6 aircrafts of the Bukovyna Airlines are in its ownership (Kovtunenکو & Pjatetska, 2018). Aircrafts used by airlines in Ukraine are manufactured by the world's leading aviation manufacturers. That is, in Ukraine, there is a trend of using aviation equipment of the leading world manufacturers on a lease basis.

According to the Civil Aircraft Register of Ukraine (SAAU, 2020), the average age of aircraft is about 25 years. In the authors' opinion, this in-

dicates that most of the analyzed airlines work on the average level to upgrade the logistics facilities, improve their technical level and aviation safety. Unfortunately, most Ukrainian airlines do not buy new aircraft due to a lack of working capital. Such a situation with mass exploitation of already used aircrafts by Ukrainian carriers adversely affects the level of aviation safety in general, as well as the level of safety of aviation workers and passengers in particular.

It is also needed to take into account that nowadays, the situation on the air transportation market is changing rapidly due to COVID-19 impact. It turns to be the most influential trend in future. Many airports and airlines are currently closed and cannot survive without government support. In this case, it is expected that many airlines could be nationalized; therefore, the market will be transformed. For example, it is hard at the cur-

rent moment to calculate the real cost of all consequences because of the COVID-19 restrictions at the air transportation market in Ukraine. Besides, experts believe (Obukh, 2020) that the profitability of the airlines in Ukraine returns to the previous values from 2 to 4% only in the best case.

Another challenge, which is arising in the air transportation market, is the transformation of world integrations processes. It is clear that global processes will possibly change from globalization to localization. Therefore, people will not probably travel on crowded transport and will prefer individual transportation. So, on the one hand, local airlines and charters flights will be developing, on the other hand, this business will lose profitability. That is why there will be plenty of airlines, which could go bankrupt, as well as there will be sharp needs in many airports, especially in small countries.

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## CONCLUSION

In this research, the current trends of air transportation market development in Ukraine are identified. The basis of such identification was the analysis of the external environmental risks of airlines that are the major actors of the air transportation market and the analysis of the main factors that have an impact on the development of this market.

The results obtained in the research confirmed the working hypothesis that the main trends of air transportation market development in Ukraine correspond to the world ones, but the riskiness of the external environment of the airlines is very high. That is, the market as a poly-subject environment for the activity of airlines as business entities in Ukraine is not conducive to doing business. The following trends mark the current state of the air transportation market: confirmation of the interdependence of GDP growth in Ukraine and the passenger air transportation; confirmation of urbanization influence on prospects of “hub” creation in Ukraine based on Boryspil Airport; establishment of partner connections under the influence of globalization, but the form of its implementation is different; the urgent need to improve aviation safety, which is directly linked to the development of human capital in air transportation enterprises, primarily through passenger safety and employee safety; the use of aviation technology by leading manufacturers on a lease basis in the majority of cases; introduction of modern technologies in human capital management of air transportation enterprises by satisfying international standards.

The practical value of this paper is in the possible usage of the obtained results by official authorities of the EU and Ukraine when developing strategical and tactical steps of further cooperation in the air transportation sphere.

The interrelation of the impact factors analyzed in this paper with the discussed COVID-19 changes in the development of the air transportation market should be studied in further publications.

## AUTHOR CONTRIBUTIONS

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