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AIR TRANSPORT IN RUSSIA AND ITS IMPACT ON THE ECONOMY

The study aims to collect and analyse statistics of Russian air transport, show the influence of air transport on the national economy over the period from 2007 to 2016, compare the sector's role in Russia with the one in other countries. The study reveals the significance of air transport for Russian economy by comparing airlines' and airports' monetary output to the gross domestic product. On the basis of the research, the policies in the aviation sector can be adjusted by government authorities.
Ключевые слова: *Russia, aviation, GDP, economic impact, air transport, statistics.*

Introduction

According to Air Transport Action Group, the air transport industry supports 62.7 million jobs globally and aviation's total global economic impact is $2.7 trillion (approximately 3.5% of the Gross World Product) [1]. Aviation transported 4 billion passengers in 2017, which is more than a half of world population, according to the International Civil Aviation Organization [2]. It makes the industry one of the most important ones in the world. It has a considerable effect on national economies by providing a huge number of employment opportunities both directly and indirectly in such spheres as tourism, retail, manufacturing, agriculture, and so on. Air transport is a driving force behind economic connection between different regions because it may entail economic, political, and social effects. For instance, air transport may enhance trade and personal mobility that are parts of globalization. All mentioned above proves that the role of aviation should be carefully determined for each country in the world in order to make some improvements in the sector which can lead to economic development of the whole country.

The purpose of this study is to estimate the influence of air transport industry on the economy of the Russian Federation so as to understand the importance of the aviation sphere for the country and compare its performance with global tendencies. The goal is to calculate and analyse the economic footprint of the industry and determine whether there is a growing trend of the contribution to Russian economy.

In order to perform the study, it is necessary to examine the literature on the economic influence of air transport and find out the approaches which are used to determine it. One of the main obstacles for conducting the research is the fact

that a lot of financial data are not publicized by the companies which perform in the industry because they are considered as a commercial secret. Therefore, a vast amount of information about aviation's economic benefits could be explored in research papers of the International Air Transport Association (IATA), Oxford Economics and state agencies which have an access to confidential information. Using aggregated data, those organizations publish country-level studies. In addition, some papers place emphasis on the most essential airline of a particular country and explore its contribution to the economy. It is necessary to mention that none of Russian airlines was an object of such kind of research. This fact and the small number of papers about Russian aviation economic impact which could be found indicate that the chosen topic is poorly explored in terms of the country. With the aim of letting this article fill the gap in such kind of studies, the works about other countries should be taken into consideration because some of them give detailed information about methods of research. What can be added to the examination of the literature is papers which investigate, through an example of Russia or other countries, the relationship between the national GDP and the recession or expansion of the air transport.

Material and Methods

The most extensive research of aviation economic impact was conducted by Oxford Economics, which has a series of scientific works about Economic Benefits from Air Transport in different countries [3–7]. The state comparison of aviation economic footprint, based on these reports, is shown in Table 1. In spite of the fact that calendar years of collected data vary from country to country within the interval between 2009 and 2013, it is possible to estimate that the most remarkable contribution of the aviation sector to GDP is in Iceland, Hong Kong, and Singapore whereas the least one is in Nigeria, Mexico, and Poland. What concerns employment in the aviation sector (in percentage of the total employment in a country), the USA, Iceland, and Singapore are leaders in this rating; Nigeria, Mexico, and Peru are at the bottom of the list. As for the Russian aviation sector, it is 29th in the contribution ranking and 28th in employment ranking (of 41 countries).

Table 1. **Countries Compared by Aviation Economic Footprint**

Country	Calendar Year	Contribution of the aviation sector to GDP (% of economy)	Employment in the aviation sector (% of total employment)
Australia	2009	2.6	2.89
Austria	2009	1.3	1.51
Azerbaijan	2011	0.8	0.65
Belgium	2009	1.7	1.9
Brazil	2009	1.0	0.74
Canada	2009	2.2	2.34
Chile	2009	1.6	1.11
China	2010	0.8	0.64

Country	Calendar Year	Contribution of the aviation sector to GDP (% of economy)	Employment in the aviation sector (% of total employment)
Colombia	2009	0.7	0.67
Czech Republic	2009	0.7	0.63
Denmark	2009	1.2	1.62
Finland	2010	3.2	4.23
France	2009	3.2	3.04
Germany	2009	2.0	2.12
Greece	2009	2.5	2.19
Hong Kong	2009	5.5	4.36
Iceland	2010	6.6	5.55
India	2009	0.5	0.38
Ireland	2009	2.6	2.75
Italy	2009	0.8	0.86
Japan	2009	0.7	0.68
Jordan	2010	2.2	1.91
Kenya	2009	1.1	0.35
Mexico	2009	0.4	0.35
Netherlands	2009	2.1	2.04
Nigeria	2010	0.4	0.33
Norway	2009	2.0	2.44
Panama	2013	4.2	2.51
Peru	2010	0.5	0.35
Poland	2009	0.5	0.41
Russia	2010	0.9	0.78
Saudi Arabia	2010	1.8	1.60
Singapore	2009	5.4	4.55
South Africa	2009	2.1	1.62
South Korea	2009	0.8	0.60
Spain	2009	1.4	1.36
Sweden	2009	1.7	1.84
Thailand	2009	1.5	1.02
Turkey	2009	1.1	0.96
United Kingdom	2012	3.4	3.24
United States of America	2010	4.9	6.67

Source: Oxford Economics, OECD, The World Bank.

Oxford Economics papers about Norway, the United Kingdom, the United States of America and others can be linked together through structure, approach to economic contribution division and methods of research which are required to be outlined. Firstly, with the objective to determine benefits to passengers and shippers valued in money, the authors had to find information about passenger numbers, freight tonnage, average fares and estimate elasticity of demand. The latest indicator is of special importance because it depends on many factors and should be used very carefully. For example, income elasticity of demand is not the same in developed and developing countries. As a result of it and the indicator's dependability on the geographic factor and flight length, it would be appropriate to

pay special attention to it in the conditions of demand in the Russian Federation. The authors referred to InterVISTAS Consulting Inc. [8], but it is not up-to-date. Secondly, the connectivity index, which qualifies air transport network in the country, was easily calculated on the basis of public data; whereas Benefits for Tourism required Oxford Economics Travel and Tourism model that was a source of estimation of an amount of GVA created by foreign air-travel visitors and of dividing this GVA to direct and indirect. However, the study did not give consideration to economic losses from domestic residents who travel abroad. Thirdly, the direct economic footprint was measured by GVA; the indirect and induced ones by using Input-Output tables. The indirect output is derived from these tables as the use of the output of the other industries in the process of production in the aviation sector and the use of their final output. The induced output is calculated as a final domestic consumption by employees of the sector and related ones.

The same approaches to research as mentioned above were used by Oxford Economics to estimate major national airlines' impact to their country's economy. As was said earlier, there are no such papers about Russian airlines; however, some of them should be observed. Oxford Economics papers place particular emphasis on Emirates, Aerolíneas Argentinas and Air Namibia's vitality for national economies and consider connectivity as the principal component of their success, hence, their high contribution to the Gross Domestic Product [9--11]. Another paper about United Arab Emirates and especially Emirates Airline not only describes the impact of aviation on national economy, but also reveals the vitality of Emirates Airline for other countries and summarizes factors that make the air transport sector extremely valuable for the economy [12]. It might also be noted that the discrete paper was devoted to the importance of connectivity for national economy [13]. Similar ideas can be found in IATA's report [14]. So as to confirm that connectivity has a key role in economic growth, the econometric model was developed. Based on the calculations, it was stated that improved links between countries can stimulate higher productivity and GDP, which in turn helps support a country's aviation industry.

Special attention has to be paid to the paper that shows aviation contribution to GDP as well as relationship between the growth of the economy and the growth of air transport. The report by Oxford Economic Forecasting uses the same approach to aviation impact calculations as the other Oxford Economics Papers, but it goes further and reveals the existence of strong links between the attractions of foreign direct investment and its location, between intensively-grown sectors in UK economy and aviation services, between aviation industry and the productivity growth of other sectors of economy [15]. The authors highlight four main routes through which aviation affects other sectors:

– Intermediate demand generates indirect effects on supply chain;
– Changes in supply affect aviation prices which affect intermediate costs;
– Aviation output facilitates productivity growth elsewhere;
– Productivity also affects returns to capital, hence the level of investment.

The researchers use Input-Output tables, the Cobb–Douglas production function and the "Dynamic Panel" data model and a few more econometric models

to calculate the transport effect on different each sector of economy. The effect of transport on private output was estimated with some approximation. It was concluded that an extra £1 of aviation output raises the output of a typical industry by 7.4p. The final section of the study gives a variety of scenarios of aviation impacts in 2015 based on macro and sectoral models. The techniques can be valid for other countries' calculations.

Another research provides the evidence for thinking that the growth of the Gross Domestic Product has a strong link with and causes the growth in the aviation sector based on the example of a particular country – Romania [16]. The authors used such econometric tests as Fully Modified Ordinary Least Squares, Dynamic OLS, Conical Cointegration Regression and came to the conclusion that cointegration between economic growth and aviation demand exist. They summed up that the maximum impact on air transport (the growth of the sector) occurs after six years of continuous growth of GDP. However, Cook and Billig, who based their calculations on the data from World Bank and Airlines for America, found no time gap between a change in economic growth and world airline profits [17, p. 310]. According to the book, "periods of slower but positive, GDP growth are accompanied be often large airline losses." As for the growth of passenger traffic, the authors did not give any information, but, for example, in Bulgaria, there is a strong correlation between growth in GDP and the growth in number of passengers [18]. It is assumed that the same dependability exists worldwide.

The other papers which were examined can be united by the governmental origin of authors – these are departments of state. The studies by Arizona Department of Transportation and Wyoming Department of Transportation describe initial economic and multiplier impact of aviation in the regions [19, 20]. Thanks to the fact that the Departments have unlimited access to the data and the amount of it is not so big (for instance, there are only 10 commercial service airports in Wyoming), they could calculate payroll and output from every employee and every company which is part of supply chain in the aviation industry. What can be taken as a tool from these reports is the examples of surveys for airports and airlines which could be applied to collect appropriate information.

The main downside of Oxford Economics and other papers is considered to be non-dynamic analysis of the contribution. However, Fung et al. did extensive research and explored the contribution of air transport to the economy of Hong Kong from 2000 to 2004 [21]. It helps not exclusively monitor the changes in impact of aviation on country's economy, it gives an opportunity for further discussion. For example, having followed a variety of results, it is possible to compare them to other economic and non-economic factors and define which of them have major influence on performance in the aviation sector.

Since the Russian Federation is the primary object of this research, a number of papers which have a strong link to the aviation sphere in national economy were taken into account. The most up-to-date study, which was found about the entire aviation impact in the chosen country, describes consumer benefits for passenger and shippers, highlights connective as of one of the main factors of

long-term enhancing of economic performance and indicates economic footprint of the industry, which was calculated on the basis of Gross Value Added (GVA) [22]. The authors divided the sector's economic contribution to direct, indirect and induced. The main idea of it is to illustrate that not only airlines but also ground-based infrastructure, which is usually underestimated, has a role to play in Russian economy. In the last part of the research, catalytic effect is also added to calculations because air transport is interrelated to tourism, trade, production etc., and it can be a driving force behind increases or decreases in these sectors. Oxford Economics came to the conclusion that aviation represents 0.9% of the Gross Domestic Product of the Russian Federation and 0.8% of the Russian workforce. Having added catalytic impact, it was mentioned that these indicators increase by 0.2% and 0.1%, respectively. In addition, a higher than average productivity by each employee in the aviation sector was estimated and an amount of tax revenues was computed. The paper highlights a significant vitality of air transport in Russia by summarizing the following facts (the numbers reported relate to the calendar year 2010):

– the aviation sector contributes USD13.34 billion in GVA to Russia, equivalent to 0.9% of the Russian economy;

– the aviation sector pays over USD1.24 billion in tax;

– the aviation sector supports 543,000 jobs in Russia;

– the average air transport services employee generates USD37,609 in GVA annually, which is around 1.7 times more productive than the average in Russia;

– a 10% improvement in connectivity relative to GDP would see a USD0.95 billion per annum increase in long-run GDP for the Russian economy.

As far as can be inferred from the importance of these facts, the analysis of the aviation sector can be used not only by government which can adjust its influence on air transport but also by foreign businesses that may be interested in investing in the Russian economy.

The majority of authors highlight that the impact from air transport on the economy in the Russian Federation is significant. Kurzeneva outlines that sustainable development of air transport is one of the priority directions for promoting economic growth of the country, as the advancement of the civil aviation leads to the development of many other industries: engineering, manufacturing, mining, etc., and it is a method of reducing unemployment through creation of jobs [23]. As a result of these factors and as it is a driving force behind arise in business links between regions within the country and overseas, the improvement of air transport in the Russian Federation modernizes the whole country's economy.

According to Samoylov et al., aviation in the system of transport in Russia has a special role to play because of the geographic characteristics of the country and its administrative and territorial division [24]. The authors emphasize that the arising demand on air transport in the country, which has been noted since 2001 and which exceeds global average, will continue until at least 2030. It is stated that GDP elasticity of demand for air transport is higher than in the world. Consequently, specific attention has to be given to the aviation sector in Russia because its role in the economy is growing.

Balashov and Smirnov estimated a model that forecasts a demand on air transport in the Russian Federation which depends on Gross Domestic Product [25]. They concluded that the higher the GDP in the country, the bigger the "effective part" of population that travels by air; therefore, the higher the impact of aviation on the GDP. Nonetheless, the forecasts of air traffic based only on economic factors are highly criticized by some authors. For example, Ryazanov emphasizes that such non-market factors as "changes of institutional environment, deregulation of the industry, emergence of low-cost air carriers, airports capacity limits and the development of ground transport" can make econometric model totally incorrect [26]. According to his regression model, air traffic in Russia will be 3.46 times bigger by 2030 than it was in 2011. In addition to the factors which affect air traffic mentioned by Ryazanov, some authors add currency exchange rate and political climate, quality of service [27]. The others also include such black swan events as terroristic attacks, for example the September 11 attacks in New York in 2001 or 2004 Russian aircraft bombings [28].

The interdependence of connectivity, productivity and economy on regional level was estimated in case of the Russian Federation. On the basis of mathematical models, Gubenko and Borodulina created a formula of the population transport mobility index for regions [29]. The authors come to conclusion that population transport mobility correlates with Gross Regional Product and average per capita income and state that it is necessary to pay attention to the index because it shows regions' business activity and stability, which is of vitality for the whole national economy. Michalchevskyi also mathematically proves the idea of relationship between air transport and Russian economy [30]. The author sums up that the more developed air transport is in different regions, the higher Gross Regional Product and, consequently, the better the whole economy performance.

Shcherbanin gives a comparison of such indicators as gross domestic product per capita and air passenger traffic per capita from 2000 to 2014 in the Russian Federation [31]. From the examination of econometric models, a strong link between the Gross Domestic Product and the number of air passengers was verified. However, air traffic reliance on income and salary of the population was refuted. One of the probable reasons for it, according to the author, is too low level of basic wages. Additionally, it is vital to mention that only 13–13.5 million of citizens use air transport and have, on average, three trips per year and the ratio of international to domestic trips is approximately two to one. It means that Russian economy has huge losses of the money spent by its citizens in other countries. It demonstrates that the aviation sector, especially domestic one, is not developed enough in Russia, and, therefore, its share in GDP could be higher than it is now.

Summarizing these papers, the essence of air transport for Russian economy is undeniable. However, with the intention of illustrating the impact from the aviation sector in the country, it is necessary to estimate its extensive effect on the GDP in monetary terms. Thanks to these calculations, it would be easier to understand the role of air transport in Russia, alter the course of government politics in terms of the aviation sector and reveal factors that can produce an increase in aviation and national economy.

Methodology

Having analysed the literature and different approaches used by the authors to estimate the impact of air transport on national economies, it was inferred that the majority of authors follow the same path of calculations as was offered by Oxford Economics. It includes the steps which are described in the following paragraphs and this paper is based on the same methodology; however, it had to be adapted to the Russian Federation by cross-referencing International Financial Reporting Standards and Russian Accounting Principles, data approximating and searching for financial information in open sources. What else distinguishes this research is its dynamic approach. Whereas other authors tried to estimate aviation impact for one year, this paper is devoted to the period of time from 2007 to 2016. As for the data for the research, a broad range of sources was used to achieve sufficiently precise results which leads to better understanding of the role of aviation in the economy of Russia.

Along with Oxford Economics, it is necessary to divide the aviation sector into two main categories for a better understanding of the key players:

– Airlines as companies that provide transport for people and freight;

– Ground-based infrastructure as organizations that provide facilities for airlines and services for people and freight. It includes not only on-site services, such as airport utilities, but also off-site ones that are connected with air traffic control and air regulation.

The economic activity of these two sectors should be divided into four distinct channels:

– Direct: the output and employment of the firms in the aviation sector.

– Indirect: the output and employment supported through the aviation sector's Russian based supply chain.

– Induced: employment and output supported by the spending of those directly or indirectly employed in the aviation sector.

– Catalytic: spillover benefits associated with the aviation sector. It includes the activity supported by the spending of foreign visitors travelling to Russia via air.

With the purpose of estimating the direct economic impact of airlines and the ground-based infrastructure, the income approach to the calculation of the Gross Domestic Product, which is contributed by the aviation sector, should be used. It is based on adding up the factor of incomes to the factors of production in the society.

Income Approach Formula

$$GDP(A) = COE + GOS + T(P\&M) – S(P\&M)$$

– GDP(A) is Gross Domestic Product which is generated by the aviation sector.

– Compensation of employees (COE) measures the total remuneration to employees for work done and additional payments, connected to it. COE includes salaries, wages, and fringe benefits such as health or retirement.

– Gross operating surplus (GOS) is the surplus due to owners of incorporated businesses.

– T(P&M) is taxes on production and imports.

– S(P&M) is subsidies on production and imports.

What has to be noted is the fact that Gross Operating Surplus is not directly singled out from organization's financial data. This article takes an example from an Oxford Economics report which considers GOS equal to EBITDA (profits, defined as earnings before interest, taxes, depreciation and amortization) [32].

With the aim of proving that this approach is valid, it was compared to official methodology of the United Nations on the basis of official financial reports of Aeroflot – Russian Airlines [33]. It was inferred that there is a small difference between EBITDA and GOS (EBITDA in 2016 Aeroflot report – 78,004 mln RUB; GOS using UN methodology – 78,060 mln RUB); however, it can be neglected due to the scarcity of indicators discrepancy in the scale of airline (0.07%)[1]. Thus, there is no obstacle to equating Gross Operating Surplus with EBITDA.

The indirect output component can be measured using Input-Output table. It shows how industries use the output of other industries in the process of production, and how their final output is used. The table includes economic output of all companies which are a part of a supply chain for the industry.

The Input-Output table can also be used to estimate the induced output, which implies how much spending on completed goods (known as final domestic consumption) is supported through the employees of the industry and its full supply chain.

The main sources of data for the research are airlines' annual reports, information from Russian Federal Air Transport Agency (Rosaviatsiya) and the data of Analysis and Information Systems which have an advanced access to financial information of public companies [34].

Results

Air Transport in the world and in Russia. Overview. International Air Transport Association predicts air passenger number to grow in the following years, and it is going to double to seven billion annually by 2034 [35]. However, it is commonly known that some countries have more developed air transport systems than others. So, as to compare the countries by their levels of development in the aviation sector, the following table was created. It represents the ratio of travellers who use air transport versus the population of a country. The countries, about which Oxford Economics papers have aviation impact reports were chosen. The results are based on different national agencies' reports, Oxford Economics estimations and authors' calculations.

[1] Derived by dividing GOS by EBITDA.

According to the table, a lot of countries have a very developed aviation sector and national airlines carry passengers other than the population of a country. However, it is necessary to mention that both domestic and international air passengers are included into calculations. Especially, it is very highly noticeable in Iceland, which has a relatively small population, but its airlines carry a lot of international passengers from Europe to North America with a stopover in Reykjavik, consequently, the number of passengers is 16 times more than the population. Russian airlines carry 61% of the population and it is one of the lowest number of all selected countries. It could mean that the aviation sector in the country is underdeveloped.

Table 2. **Air Passengers statistics worldwide in 2016 (authors' calculations)**

Country	Population of the country (World Bank)	Air passengers carried (% of population)	Air passengers carried include both domestic and international aircraft passengers of air carriers registered in the country	Air passengers served by airports in the country (% of population)	Air passengers served by airports in the country	Source
Australia	24,127,159	485%	117,103,424	n/a	n/a	Bureau of Infrastructure, Transport and Regional Economics
Austria	8,747,358	186%	16,308,907	317%	27,692,089	Eurostat
Belgium	11,348,159	96%	10,841,700	265%	30,127,564	Eurostat
Brazil	207,652,865	23%	48,370,114	50%	104,793,776	Infraero Government
Canada	36,286,425	198%	71,886,109	386%	140,155,882	Canada's national statistical agency
Chile	17,909,754	74%	13,304,215	173%	30,924,291	Civil Aviation Board of Chile
China	1,378,665,000	35%	487,960,477	74%	1,016,357,068	Civil Aviation Administration of China
Colombia	48,653,419	69%	33,763,465	137%	66,755,939	Civil Aviation Authority of Colombia
Czech Republic	10,561,633	n/a	n/a	130%	13,755,000	Eurostat
Finland	5,495,096	208%	11,402,971	378%	20,788,834	Eurostat
France	66,896,109	n/a	n/a	260%	174,209,048	Eurostat
Germany	82,667,685	153%	126,432,995	272%	224,462,237	Eurostat
Greece	10,746,740	136%	14,573,879	500%	53,719,552	Eurostat
Hong Kong	7,346,700	591%	43,454,423	954%	70,098,216	Hong Kong International Airport

Country	Population of the country (World Bank)	Air passengers carried (% of population)	Air passengers carried include both domestic and international aircraft passengers of air carriers registered in the country	Air passengers served by airports in the country (% of population)	Air passengers served by airports in the country	Source
Iceland	334,252	1587%	5,305,415	2035%	6,801,814	Eurostat
India	1,324,171,354	9%	124,367,744	20%	261,772,000	The Directorate General of Civil Aviation, Ministry of Civil Aviation India
Ireland	4,773,095	n/a	n/a	688%	32,832,906	Irish Aviation Authority
Italy	60,600,590	75%	45,731,691	272%	164,778,052	Eurostat
Japan	126,994,511	94%	119,177,132	230%	291,671,337	Ministry of Land, Infrastructure, Transport and Tourism of Japan
Jordan	9,455,802	32%	3,002,000	81%	7,621,599	Civil Aviation Regulatory Commission, Royal Jordanian, Jordan Aviation
Mexico	127,540,423	42%	53,627,000	98%	124,690,000	The Directorate General of Civil Aeronautics
Netherlands	17,018,408	231%	39,378,077	413%	70,319,632	Eurostat
Nigeria	185,989,640	3%	6,432,883	8%	15,232,597	National Bureau of Statistics
Panama	4,034,119	319%	12,870,000	365%	14,741,937	Copa Airlines, Tocumen Airport, Department of Statistics
Peru	31,773,839	46%	14,627,066	96%	30,639,891	The Ministry of Transport and Communications
Poland	37,948,016	18%	6,881,699	99%	37,589,150	Civil Aviation Office Poland
Russia	144,342,396	61%	88,559,231	111%	159,597,375	Federal Air Transport Agency
Saudi Arabia	32,275,687	106%	34,308,767	261%	84,309,963	General Authority for Statistics
Singapore	5,607,283	n/a	n/a	1047%	58,700,000	Civil Aviation Authority of Singapore
South Africa	55,908,865	40%	22,245,204	71%	39,877,142	Airports Company South Africa

Country	Population of the country (World Bank)	Air passengers carried (% of population)	Air passengers carried include both domestic and international aircraft passengers of air carriers registered in the country	Air passengers served by airports in the country (% of population)	Air passengers served by airports in the country	Source
Spain	46,443,959	154%	71,732,654	489%	227,306,675	Eurostat
Thailand	68,863,514	82%	56,397,210	174%	119,923,998	Airports of Thailand
Turkey	79,512,426	108%	86,032,427	219%	174,153,146	General Directorate of State Airports Authority of Turkey
United Kingdom	65,637,239	234%	153,607,001	409%	268,385,920	Department for Transport, Civil Aviation Authority
USA	323,127,513	256%	826,587,219	513%	1,658,112,265	Bureau of Transportation and Statistics

According to the Federal Air Transport Agency, Russian airlines demonstrated decades of continuous growth until 2014 in such indicators as passenger turnover, revenue-tonne kilometres, air cargo turnover and passenger traffic. However, the Russian financial crisis led to a huge slump in the air travel market in 2014 and 2015. In the following years, the market bounced back and in 2017 Russian airlines surpassed the milestone of 100 million carried passengers (it has been the first time in the history of Russian Federation since 1991).

One of the peculiarities of the Russian air travel market is that airlines carry much more passengers on domestic routes and their expansion on international routes is not intensive. Ergo, the growth of passenger traffic is usually generated by passenger transport within the country. As a major obstacle of stagnation on routes abroad can be defined an economic situation in the country, instability of national currency exchange rate and low purchasing power of citizens. What gives rise to hope for further expansion of passenger air transport in Russia is a rise in passenger load factor both on domestic and international routes.

The opposite situation is in the air cargo market. The international sector plays a key role in the whole sphere of cargo transportation in Russia. Especially, it is more obvious if to look at Air Cargo Turnover. International shipping is a few times bigger in numbers than domestic services. It can be explained by the fact that the distance of shipping cargo abroad is longer than domestic one and the leader in this market, AirBridgeCargo, uses its planes on routes to the USA and China, which are quite far from Russian large cities, such as Moscow and Yekaterinburg.

Over the period of ten years, a number of Russian airlines emerged, went bankrupt, experienced mergers and acquisitions. Due to the fact that market concentration has an effect on airlines' performance, the following graph has been analysed.

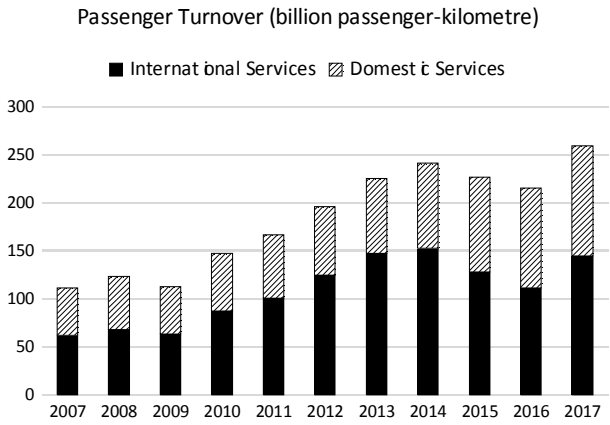

Fig. 1. Passenger Turnover in Russian airlines in 2007–2017 (billion passenger-kilometre)

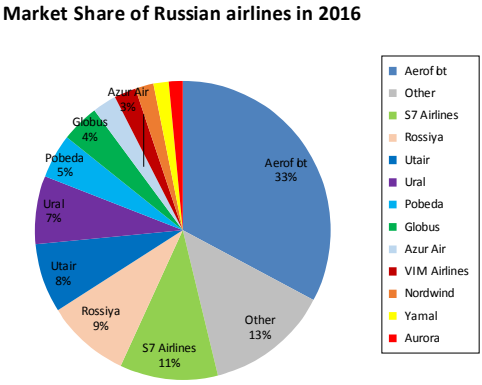

Fig. 2. Market Share of Russian airlines in 2016

It is necessary to mention that this chart represents separate airlines; however, some of them can be a part of a group (for example, Globus and S7 Airlines are a part of S7 Group). The market share of airlines, each of which has no more than 1.5% of market, has decreased by two times over the period of 10 years. Some airlines, which were leaders of the market in 2007, quit their operations (Transaero, VIM Airlines, KrasAir, Atlant-Soyuz, Tatarstan, Domodedovo, Vladivostok Air, Orenair). The reason for it is that airlines business is extremely risky in Russia and it is heading to oligopoly or even monopoly, if we look at Aeroflot Group[1].

Economic impact of air transport in the Russian Federation. One of the obstacles in combining financial data is the fact that the companies use different reporting standards. Since the International Financial Reporting Standards is not

[1] Aeroflot Group in 2016: Aeroflot – Russian Airlines, Pobeda Airline, Rossiya Airlines, Aurora, Donavia, Orenair.

wide-spread in the Russian Federation, only Aeroflot Group and Utair provide financial reports in that format. At the same time, the majority of airlines and ground-based organizations use Russian Accounting Principles. In order to combine the tables, both of these formats IFRS and RAP were harmonized on the basis of Ernst & Young LLC analysis [36].

Another impediment to the analysis is the fact that not all airlines and airports in Russia are required to provide their financial reports publically. For example, the lowest percentage of airlines with open financial results (67.1%) was in 2015, the highest one (81.7%) in 2011. In order to pass through this obstacle, the data were combined using the following methods and assumptions:

– Gross Value Added (and its components) for 100% of organizations = total financial data for organizations which was managed to be found ÷ the market share of those organizations.

– In 2007–2010, total financial data were found in open sources, such as Analysis and Information Systems and official financial reports only for some airports from TOP-25 in the ranking of airports by total number of passengers[1].

– Gross Value Added (and its components) for 100% of airports in 2007–2010 = total financial data for airports from TOP-25 ÷ the market share of those airports in TOP-25 ÷ the market share of TOP-25 airports.

– In 2011–2013, total financial data were found in open sources, such as Analysis and Information Systems and official financial reports only for some airports from TOP-35 in the ranking of airports by total number of passengers[2].

– Gross Value Added (and its components) for 100% of airports in 2011–2013 = total financial data for airports from TOP-35 ÷ the market share of those airports in TOP-35 ÷ the market share of TOP-35 airports.

– The market share of TOP-35 (TOP-25) airports is calculated not for every year separately but as an average indicator on the basis of the only existing official data about annual total number of passengers, which was managed to be found. Thus, the market share of TOP-35 (TOP-25) airports = (the market share of TOP-35 (TOP-25) airports in 2014 +… in 2015 + … in 2016) ÷ (total number of passengers in airports in 2014 + … in 2015 + … in 2016).

– Custom Duties for 100% of airlines = (Aeroflot Group Custom Duties + Utair Group Custom Duties) ÷ (the market share of Aeroflot Group + the market share of Utair Group).

It is necessary to emphasize that custom duties are mentioned only for airlines which provide IFRS reports (Aeroflot Group and Utair Group, the combined market share of which varies and increased annually from 28% in 2007 to 56% in 2016)[3]. In comparison with airlines, no airport has such an item as "Cus-

[1] On average, TOP-25 airports by the total number of passengers represent 86.3% of the total number of passengers in Russia (authors' calculations)

[2] On average, TOP-35 airports by the total number of passengers represent 91.3% of the total number of passengers in Russia (authors' calculations).

[3] Authors' calculations on the basis of Air Passenger Traffic statistics by the Russian Federal Air Transport Agency and the Russian Transport Clearing House.

tom Duties" or its equivalent in its financial report, so this line is left empty. It is necessary to mention that an insufficient amount of financial data for cargo airlines for the whole period from 2011 to 2016 were found. Due to this reason, it was decided not to include cargo airlines into the calculations. However, an additional insight to the economic impact of those airlines can be given. What can be inferred from the data is that cargo airlines are also important for Russian economy. They contribute a significant amount of money. For example, in 2010, their direct GVA was about as much as 10% of a passenger airline alone.

Due to the fact that Oxford Economics does not provide profound information about what organizations other than airports are included into the ground-based infrastructure, it was hard to determine whether an organization should be considered as the one which has direct impact on economics or instead, indirect or even induced. Thus, these estimations of Gross Value Added of ground-based organizations are unlikely to match with Oxford Economics ones.

With the intention of finding out which organizations to include into the ground-based infrastructure other than airports, the working paper of Kupfer and Lagneaux was examined [37]. The authors provided the list of organizations they collected data about, but it is a lot wider than the Oxford Economic one. For example, this paper consists of not only airports, airlines, maintenance organizations and governmental authorities, but also the authors included travel agencies in the Air Transport cluster. At the same time, Oxford Economics classified travel agencies as a catalytic impact of air transport. Having met such a big difference in approaches and found out the precise organizations included into the air transport segment, it was decided in this article to pay attention only to those organizations that have direct and valid connection to the aviation sector in Russia. The official documents of the Russian Federal Air Transport Agency (Rosaviatsiya) were analysed, and it was decided to include into calculations only organizations mentioned in those documents. Other than the airports and airlines, there was a list of maintenance and repair organizations with certificates of compliance. It was assumed that these organizations were the only ones which could prove to be included into the direct impact of the sector on the economy. The rest of the organizations which interact with airports and airlines, can be considered as either direct or indirect. With the aim of being absolutely sure that there is no mistake in defining the belonging to the direct channel of supporting GDP through, only organizations from Rosaviatsiya documents were included into calculations.

Unfortunately, the majority of organizations, especially ground-based ones, excluding airports, do not provide publically sufficient amounts of financial data. Consequently, it is next to impossible to credibly estimate the impact of each organization, which operates in the aviation segment, on the economy of the country. One organization is considered to be highly important for the sector and provides at least some amount of financial data is FGUP "Goskorporatsiya po OrVD". This governmental organization is responsible for air navigation services, air traffic control and owns the whole infrastructure which is related to those activities. It was decided to pay attention to this organization and choose it as the only representative of ground-based infrastructure, except airports. The remarkable

amount of property, the considerable number of employees and high profits let FGUP "Goskorporatsiya po OrVD" contribute more than 77 billion Russian roubles in 2016, which is as much as 32% of all Russian airlines direct GVA. Therefore, the importance of this organization should not be underestimated.

Since there are not enough data for ground-based organizations, only airlines and airports constitute the aviation sector and were included into the calculations of the total impact of air transport on Russian economy in this article. In order to compare the Gross Value Added of the aviation sector and Russian economy, the nominal Gross Domestic Product of the Russian Federation was taken.

Table 3. **GVA in 2007–2016**

Indicators	Year									
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Russian passenger airlines (million RUB)	85,063	75,606	74,352	110,744	114,056	146,636	180,442	161,155	224,005	238,277
Russian airports (million RUB)	26,748	35,082	33,387	41,740	50,483	75,842	85,666	100,675	106,888	112,609
GDP of Russia (million RUB)	33,247,513	41,276,849	38,807,219	46,308,541	55,967,227	68,163,883	73,133,895	79,199,658	83,387,192	85,917,806
Russian passenger airlines (million USD)	7,084	6,869	5,564	8,547	9,004	10,670	12,887	9,637	8,443	8,167
Russian airports (million USD)	1,046	1,411	1,052	1,374	1,718	2,439	2,690	2,620	1,753	1,680
GDP of Russia (million USD)	1,299,899	1,660,686	1,223,311	1,524,852	1,904,463	2,192,258	2,296,342	2,061,326	1,367,947	1,281,688

Source: Analysis and Information Systems FIRA PRO, official financial reports of organizations, Russian Federal State Statistics Service (Rosstat), Central Bank of Russia.

The data let directly compare the economic performance of the airlines and airports with their impact on Russian economy. As can be seen, Russian airlines' contribution to the economy has a growing trend, excluding some periods. The drop in the performance in 2008 and 2009 can be linked to the global financial crisis, which led to many bankruptcies and restructurings of the airlines (for example, the collapse of AiRUnion alliance in 2008, which included 5 member airlines[1] serving more than 130 destinations). The slump of airlines' GVA in 2014 can be explained by the downturn of operating profit in the sector, which was caused by the Russian financial crisis, resulted in the collapse of the Rus-

[1] AiRUnion members: Domodedovo Airlines, KrasAir, Omskavia, Samara Airlines, Sibaviatrans.

sian rouble [38]. For example, on January 1, 2014, 1 US dollar (USD) equalled 32.66 RUB, but on December 31, 2014, 1 US dollar equalled 56.26 RUB.

Russian airports' impact on the economy is more sustainable to economic crises, so the decline can be seen only in 2009. As well as in the airline sector, the GVA has been increased significantly since 2007; however, this indicator is too far away from peaks in 2013 and 2014.

For a more profound analysis of Russian aviation economic impact, the indirect impact was estimated on the basis of Input-Output tables. Due to the fact that the Russian Federal State Statistics Service (Rosstat) does not provide those tables, it was decided to use tables from WIOD Project, funded by the European Commission [39]. However, the data exist only for the period from 2000 to 2014. For the rest of the years, it was decided to use the coefficient from 2014, because it is impossible to make a prediction about 2015 and 2016 without necessary information.

These coefficients differ from the ones which were estimated by Oxford Economics (2.13–2.37, authors' calculations; 1.49, Oxford Economics). One of the potential explanations could be the fact that Oxford Economics had different Input-Output tables, which do not include air transport sector separation from general transport services. It is assumed that the indirect impact of aviation is more significant than the one of other types of transport.

Table 4. **Direct and Indirect impact of the aviation sector in Russia in 2007–2016**

Indicators	Year									
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
GVA of Aviation Sector (million RUB)	238,178	249,936	255,749	357,385	381,716	503,342	605,268	601,556	760,229	806,162
GDP of Russia (million RUB)	33,247,513	41,276,849	38,807,219	46,308,541	55,967,227	68,163,883	73,133,895	79,199,658	83,387,192	85,917,806
GVA of Aviation Sector (million USD)	9,312	10,056	8,062	11,768	12,989	16,188	19,005	15,657	12,471	12,026
GDP of Russia (million USD)	1,299,899	1,660,686	1,223,311	1,524,852	1,904,463	2,192,258	2,296,342	2,061,326	1,367,947	1,281,688
Share of aviation sector in GDP	0.7164%	0.6055%	0.6590%	0.7717%	0.6820%	0.7384%	0.8276%	0.7595%	0.9117%	0.9383%

Source: World Input-Output Database, Analysis and Information Systems FIRA PRO, Russian Federal State Statistics Service (Rosstat), Central Bank of Russia.

Having multiplied the data found by the multipliers, the sum of direct and indirect impact of the aviation sector was estimated. It is necessary not to forget about the fact that the Russian rouble is not a strong currency. Having this idea in mind, the tables and graphs below include financial data expressed both in the Russian rouble and the United States dollar.

It is possible to draw an inference that there is a long-term growth of both the GVA of the aviation sector and the GDP of Russia in the Russian rouble with

little fluctuations. The main difference is that the aviation sector had more periods of decrease. However, there is a big difference in the same data expressed in Russian rouble or US dollar. It was a strong growth of both the GVA of Aviation Sector and the GDP of Russia expressed in USD from 2009 to 2013, however after that period there is an ongoing decrease of both indicators.

The share of the sector in the GDP of Russia is 0.7–0.9%. If to compare it to other sectors of Russian economy, it is approximately the same as the GVA of Section H (Hotels, Restaurants) in Rosstat statistics, approximately 1/3 of Sector M (Education), approximately 1/4 of Sector N (Health Care and Social Services) [40].

It was mentioned earlier that one of the advantages of this article is the fact that it examines the performance of the Russian air transport sector in dynamics. Ergo, it is necessary to pay attention to the increase in both the aviation sector and Russian economy over the basic year. As for the ground zero, year 2007 was taken because, for most organizations, the first financial data were found for that time. It has been mentioned earlier that the indicators in the Russian rouble do not cautiously reflect the actual situation, so the following graphs show how performance of the Russian aviation sector and national economy changed over the period from 2007 to 2016.

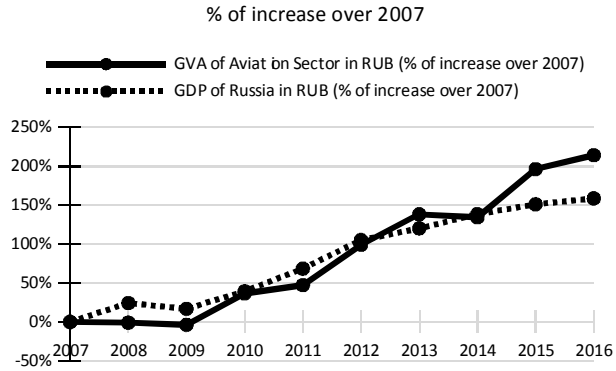

Fig. 3. Gross Value Added of Aviation sector and Gross Domestic Product of Russia in RUB (% of increase over 2007)

The conclusion from this graph is that the GVA of the aviation sector, and the GDP of Russia in RUB almost every year from 2008 to 2016 demonstrated the growth over 2007. We see that the Russian GDP and the aviation sector GVA in RUB in the country increased by more than 1.5–2 times over the period of 10 years.

In spite of the fact that, in the Russian rouble, the GDP and the GVA of the aviation sector increased by a few times over 2007, the same indicators in US dollar show an opposite result. The aviation sector increased by 20% from 2007 to 2016, and, at the same time, the Gross Domestic Product decreased 1%. It is clear to see that the comparison of different indicators in the United States dollar should not be underestimated in case of countries with not strong currencies.

Having analysed the change of the GVA of the aviation sector and the GDP over the basic year, it is necessary to look at the chaining changes. The growth

of the GVA of the aviation sector and the GDP of Russia in RUB was not stable and it fluctuated from -6% to more than 20% for the GDP and more than 40% for the aviation sector. As for the share of the aviation sector, it also showed years of decrease (2008, 2011, 2014) and increase over the previous year.

Discussion

Russian aviation has been growing since 2007. The evidence of it is passenger turnover, air cargo turnover and other related indicators. Due to such a tendency, the economic impact of air transport is turning out to be stronger. The share of aviation in the GDP of Russia increased from 0.34% in 2007 to 0.41% in 2017 if to pay attention only to direct impact and from 0.72% to 0.94% if to consider direct and indirect impact. However, other countries demonstrate higher results in each indicator, in spite of the fact that their population is smaller than Russian one. For example, the population of the United Kingdom is about two times less than in Russia (66 million vs 144 million), but UK airlines carried 1.73 times more passengers than Russian ones (154 million vs 89 million). Consequently, the share of the aviation sector in the United Kingdom is three times higher [22, 41]. To conclude, air transport in Russia is underdeveloped.

One of the probable reasons for it is the continuous growth of airline market concentration. The calculations of the Herfindahl-Hirschman index (HHI) show that the market is getting closer to monopoly. It has grown from 662 in 2007 to 1356 in 2017. If the trend goes on, in a few years, the market will be called "moderately concentrated", whereas, in 2007–2017, it is still "competitive". However, the market concentration can be even higher, if to take into consideration not separate airlines but groups.

Table 5. **Russian airline market's Herfindahl-Hirschman index (HHI) in 2007–2017 (authors' calculations on the basis of passenger traffic data in "Activity by Russian Airlines" table)**

Indicator	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
HHI	662	696	729	763	902	1048	1097	1177	1181	1441	1356

The low GDP per capita can also cause defection in the aviation sector. Since air transport is a kind of service, companies' financial results depend on customers. Russia is the 62nd in the list of per capita nominal GDP with $10,608 [42]. It is likely that air travel for Russian citizens is an expensive type of service, and only a small percentage of population is able to buy a ticket. Thus, air traffic in Russia and financial results of the sector are not as high as they are in the countries where the GDP per capita is greater than the Russian one.

The growth of air traffic can be forced by significant events in the country, such as the 2013 G20 Saint Petersburg Summit, the 2013 Summer Universiade, the 2014 Winter Olympics, the 2017 FIFA Confederations Cup, the 2018 FIFA World Cup, and others. For example, 1.2 million people visited sporting events in Sochi during the 2014 Winter Olympics and a part of them used air transport in order to get to or from the city. There could be a more detailed research about

the relationship between sport or political events in the country and air passenger traffic.

The aviation sector in Russia faces strong competition with rail transport because it is second longest in the world and it is assumed to be cheaper not only for passengers and more, for cargo shipments. The evidence of it is cargo and mail shipments in Russia. Russian railways shipped 1329 million tonnes of cargo in 2015. During the same period of time, air transport shipped 1.2 million tonnes. As for the number of passengers, the same difference is obvious: rail transport: 1025 million passengers, air transport: 94 million passengers [43]. What can be inferred from it is the fact that air transport can barely be called a competitor to rail transport and it is unlikely that in the foreseeable future it will be able to achieve the same results as railways.

This article can be a basis for the following research. One of the ways of using information from this paper could be theoretical. Since the paper studies the economic impact of air transport in Russia over eleven years, it is possible to define which factors were a driving force behind changes of aviation monetary influence on the economy in different periods of time. On the basis of the data from this research and with the help of econometric models, the factors could be estimated and used practically for adjusting governmental policies in the aviation sphere. The assumption could be that, if to stimulate competition in airline market, there will be a dramatic increase in the Gross Value Added of the aviation sector. What else could be done is studying the correlation between passenger or cargo turnover and monetary output from the aviation sector. These are not the only possible directions of future research and the rest of them can be defined by authors on their own.

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