Possible directions in the development of Russian low-cost airlines

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Abstract. Having carried out a comparative analysis of the development of low-cost airlines in European and Asian countries, the authors used a correlation-regression analysis for financial forecasting of the activities of the “Pobeda” air carrier. The article defines the factors that affect the profit and built a multi-factor regression model that allowed to calculate the forecast value of revenue. There are prospects for development and stable functioning in the market, and this is only the beginning of the transition to a new level of development in the field of transport services.

1. Introduction

The modern world, and especially the business world of people, is developing at a tremendous pace. The service sector increases the speed of providing the necessary service incomparable with what it was no more than ten years ago. People's attitude to the opportunities provided is changing. What was inaccessible to the majority of the population in the past decade now seems quite obvious and natural. Already many of those who did not even hear the concept of a low-cost airline five years ago actively use its services not only for business trips, but also for travel. The active expansion of the “Pobeda” airline's activities, not only in Russia, but also abroad, shows the necessity and natural need of the population for budget air travel. Especially in the current situation, when as a result of forced quarantine, people had to give up not only their usual rest, but also lose a significant part of their possible income the issue of saving on transport becomes more urgent than ever. The current situation allows the low-cost airline to expand its business, pay attention to a number of advantages and possible directions in the development of budget airlines in Russia.

At the moment there is only one budget airline in Russia, “Pobeda”, which started its action in September 2014 and has taken a stable position in the air carrier market. Attempts to develop discounters in Russia were not successful enough, and the imposed sanctions contributed to the liquidation of these companies.

Air transportation is in demand and popular among the population of the whole world. Modern society values time and most often uses air travel for commercial, industrial, and personal purposes. The driver for the development of the tourist cluster and attracting the flow of tourists are low-cost airlines, which increase the mobility of people and the growth of passenger traffic [1]. The cost of minimum services is affordable for any segment of the population, and each passenger has the opportunity to independently form the necessary package of services, paying for them additionally. Currently, there is a steady demand for the services of air carriers, which allows increasing the supply...
from participants in the passenger transportation market, and developing infrastructure, in particular the construction of new airports or the expansion and reconstruction of existing airports.

It is important to note that air services to the population and cargo transportation have an impact on a number of macroeconomic indicators, in particular on the global GDP and GDP of each individual country, on the level of unemployment and employment of the population [2].

For a long period of time “Aeroflot” was a large monopolist in the Russian aviation market, but in the conditions of market relations a number of air carriers appeared that could compete with the mega-company. The territory of the Russian Federation is the largest of all countries in the world, so there is a need to expand the market of carriers that will provide regional, domestic and international services. Budget airlines that are available to all categories of the population have become the most popular among the population.

2. Theoretical background
The international market of low-cost airlines has been functioning for a long time, while Russian low-cost air carriers have occupied their niche in the market relatively recently. Some of them could not withstand the competition and left the market, and the low-cost “Pobeda” airline firmly holds its positions and is becoming increasingly important for the development of the entire air transportation market.

We will conduct a comparative analysis of the activities of major foreign low-cost airlines and the Russian airline “Pobeda” for the period from 2015 to 2019. The study included the American airline "Southwest Airlines" and the Irish airline "Ryanair", which had a large weight in the global air transport market.

Budget airline Southwest Airlines is the largest low-cost airline in the United States (founded in 1971), which focuses mainly on domestic flights. It is noteworthy that the business model of this airline is used by many of the world's low-cost airlines. This company does not use the hub system and offers its passengers bonuses: to permit two free checked bags per passenger; Wi-Fi; does not charge any change fees; free in-flight non-alcoholic beverages; complimentary pretzels, free Nabisco snacks etc., “Rapid Rewards” program.

The largest budget airline in Europe is the Irish company "Ryanair", founded in 1984. The low price of tickets is provided by the fact that this low-cost carrier offers passengers a limited amount of services, and airports (destinations) are located at a far distance from cities.

Table 1 presents data on the activities of “Southwest Airlines” for the period from 2014-2019.

| Table 1. Data on the activities of the airline «Southwest Airlines» (2014-2019 years) [3]. |
|---------------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
|                                | 2014            | 2015            | 2016            | 2017            | 2018            | 2019            |
| Revenue (million USD)          | -               | 19820           | 20425           | 21146           | 21965           | 22428           |
| Passenger traffic (million people) | 138.029            | 144.575          | 151.74          | 157.677         | 157.8           | 134.0           |
| Seat occupancy (%)             | 82.5            | 83              | 84              | 83.6            | 81.9            | 82              |
| Fleet of vessels at the end of the year (units) | 665            | 703             | 720             | 731             | 746             | 742             |

Table 2 presents data on the activities of the airline “Ryanair” for the period from 2014 to 2019.
Table 2. Data on the activities of the airline «Ryanair» (2014-2019 years) [4].

|                | 2014       | 2015       | 2016       | 2017       | 2018       | 2019       |
|----------------|------------|------------|------------|------------|------------|------------|
| Revenue (million EURO) | 5654       | 6536       | 6647.8     | 7151       | 7697.4     | 8494.8     |
| Passenger traffic (million people) | 90.6       | 101.3      | 116.8      | 128.8      | 139.2      | 142.1      |
| Seat occupancy (%) | 88         | 93         | 94.3       | 96         | 95         | 95         |
| Fleet of vessels at the end of the year (units) | 308        | 352        | 393        | 372        | 400        | 439        |

Table 3 presents data on the activities of the airline “Pobeda” for the period from 2014 to 2019.

Table 3. Data on the activities of the airline «Pobeda» (2014-2019 years) [5,6].

|                | 2014       | 2015       | 2016       | 2017       | 2018       | 2019       |
|----------------|------------|------------|------------|------------|------------|------------|
| Revenue (million roubles) | 112.350    | 11029.661  | 18698.512  | 20296.003  | 33834.331  | 40780.0    |
| Passenger traffic (million people) | 39 565     | 3 089 676  | 4 285 937  | 4 582 755  | 7 184 779  | 10 287 233 |
| Seat occupancy (%) | 78         | 81.2       | 88.3       | 94.2       | 94.1       | 94         |
| Fleet of vessels at the end of the year (units) | 3          | 12         | 12         | 16         | 24         | 30         |

Financial indicators are presented in the national currency, so we will conduct a comparative analysis using dynamic relative indicators for the period 2015-2019, taking into account the fact that the Russian low-cost carrier “Pobeda” began its operations only at the end of 2014, and the first flight was made on December 1, 2014.

Table 4. Calculation of analytical indicators of the dynamics of revenue of low-cost airlines.

| year | Southwest Airlines | Ryanair | Pobeda |
|------|--------------------|---------|--------|
|      | Rates of growth, % | Growth the | Rates of growth, % | Growth the | Rates of growth, % | Growth the |
|      | with the previous year | from 2015 | with the previous year | from 2015 | with the previous year | from 2015 |
| 2015 | '          | 100      | '          | 0         | '          | 100      |
| 2016 | 103.05         | 103.05   | 3.05      | 3.05      | 101.71     | 101.71   |
| 2017 | 103.53         | 106.69   | 3.53      | 6.69      | 107.57     | 109.41   |
| 2018 | 103.87         | 110.82   | 3.87      | 10.82     | 117.77     | 117.77   |
| 2019 | 102.11         | 113.16   | 2.11      | 13.16     | 129.97     | 129.97   |

Based on Table 4, it can be seen that for the period 2015-2019, revenue increased on average for “Southwest Airlines” by 3.14%, for “Ryanair” - by 6.77%, for the Russian air carrier - by 38.66%. This confirms the budget airline “Pobeda” has defined its development vector since its foundation, and it is possible to outline the prospects for the future growth of the Russian low-cost airline.

Note that “Southwest Airlines” has decreased passenger traffic by an average of 2% over the past five years. The other two companies have increased passenger traffic on average, “Ryanair” - by 8.83%, and “Pobeda” - by 35.08%. Recently, the Russian young budget airline has been in demand among the population; it can compete in the air carrier market and become a reliable partner for the tourism business [7].


flights and, consequently, to a lack of fuel. Hence the prices for air tickets in Russia are higher than the environment.

Let's consider the 2020 situation and methods

The main advantage of discounters – the low cost of the ticket – is a combination of factors that require detailed study. So, the average cost of one air ticket is formed as follows (source: http://news.yandex.ru based on materials from open sources):

- 25% aviation fuel;
- 20% passenger and baggage service;
- 15% aircraft maintenance;
- 15% staff salary;
- 10% air navigation fees;
- 10% depreciation;
- 5% other expenses.

Table 5. Calculation of analytical indicators of the dynamics of passenger traffic of low-cost Airlines.

| Year | Southwest Airlines | Ryanair | Pobeda |
|------|--------------------|---------|--------|
|      | Rates of growth, %| Grow the rate, % | Rates of growth, % | Grow the rate, % | Rates of growth, % | Grow the rate, % |
| with the previous year from 2015 | with the previous year from 2015 | with the previous year from 2015 | with the previous year from 2015 | with the previous year from 2015 |
| 2015 | -100 | -100 | -100 | -100 | -100 | -100 |
| 2016 | 104.96 | 104.96 | 4.96 | 4.96 | 115.3 | 115.3 |
| 2017 | 103.91 | 109.06 | 9.06 | 9.06 | 110.27 | 110.27 |
| 2018 | 100.08 | 109.15 | 9.15 | 9.15 | 108.07 | 108.07 |
| 2019 | 84.92 | 92.69 | -15.08 | -7.31 | 102.08 | 140.28 |

The increase in “Pobeda's” rating is also due to the fact that the average age of the fleet is 2.3 years that ensures greater safety of transportation, while foreign competitors have this indicator much older. Thus, the average age of the fleet of the budget airline “Southwest Airlines” is 11.7 years, while “Ryanair” is slightly younger and is 7.4 years.

3. Materials and methods

The main advantage of discounters – the low cost of the ticket – is a combination of factors that require detailed study. So, the average cost of one air ticket is formed as follows (source: http://news.yandex.ru based on materials from open sources):

- 25% aviation fuel;
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- 15% staff salary;
- 10% air navigation fees;
- 10% depreciation;
- 5% other expenses.

Table 6. Dynamics of prices for aviation fuel at Russian airports in 2020.

| Period  | Average price in rubles (without VAT) | Difference to the previous period in rubles | Percentage to the previous period | Difference to the beginning of the year in rubles | Percentage by the beginning of the year |
|---------|-------------------------------------|------------------------------------------|----------------------------------|-----------------------------------------------|------------------------------------------|
| January | 53 038                              | 527                                      | 1.0%                             | 0                                             | 0%                                       |
| February| 52 341                              | -697                                     | -1.32%                           | -697                                          | -1.32%                                   |
| March   | 50 575                              | -1 766                                   | -3.37%                           | -2 463                                        | -4.64%                                   |
| April   | 49 551                              | -1 024                                   | -2.02%                           | -3 487                                        | -6.57%                                   |
| May     | 47 102                              | -2 449                                   | -4.94%                           | -5 936                                        | -11.19%                                  |
| June    | 45 995                              | -1 107                                   | -2.35%                           | -7 043                                        | -13.28%                                  |

It should be noted that the most significant component is aviation fuel. And without state support for the purchase of fuel for low-cost airlines, it is almost impossible to survive in a competitive environment. Let’s consider the 2020 situation.

Last 2019 prices for jet fuel in Russia broke all records: in the second half of the year, they increased immediately by a quarter at once. Air carriers attribute this to an increase in the number of flights and, consequently, to a lack of fuel. Hence the prices for air tickets in Russia are higher than the
average prices in Europe. Therefore, the observed downward trend in fuel prices this year only confirms the link between the cost of fuel and the number of transportations.

The observed upward trend of the share of budget air transportation in the total passenger traffic of the leading Russian airline allows to judge the correctness of the direction of transformation of the Aeroflot Group.

Table 7. Passenger traffic of Russia's leading airlines [8].

|          | 2015       | 2016       | 2017       | 2018       | 2019       |
|----------|------------|------------|------------|------------|------------|
| Aeroflot (people) | 26111728   | 28977880   | 32845182   | 35762452   | 37220668   |
| Pobeda (people)  | 3089676    | 4285937    | 4582755    | 7184779    | 10287233   |
| Share (%)       | 11.8325222 | 14.79037   | 13.95259   | 20.09029   | 27.6385    |

The forecast for a 30% share in the near future is quite consistent with the statement of Aeroflot PJSC Vitaly Savelyev at a regular meeting of the Board of Directors of PJSC Aeroflot on July 16, 2020, where he presented the Group's development strategy for the period up to 2028 [9]. His forecasts of the development of low-cost flights by low-cost airline “Pobeda” at the level of 55-65 million passengers per year with the expected growth of passenger traffic of the Group's airlines to 130 million passengers per year by 2028 confirms the correctness of the exponential growth model chosen by the authors based on a comparative analysis of the development of the Asian and European models low-cost airlines [9]. The strategy is called “30/30” and assumes an increase in passenger traffic by 30 million and a decrease in prices in economy class in Russia by up to 30%. The implementation of such ambitious plans will allow the Group to enter the ten largest aviation holdings in the world.

To study the direction of development and competitiveness in the business aviation market of the budget airline “Pobeda”, we will use a correlation and regression analysis. For the period from 2014 to 2019, data were obtained (table 6) describing the dependence of revenue (minus value added tax and excises) Y (rubles) on the cost of fixed assets $X_1$ (rubles), on the amount of seat occupancy $X_2$ (%), on the number of destinations $X_3$.

![Share of low-cost flights in Aeroflot (%)](image_url)
Table 8. Data on the activities of low-cost carrier “Pobeda” (2014-2019 years) [3], [4], [5].

| year | Revenue (rubles) | Fixed assets (rubles) | Seat occupancy (%) | Destinations |
|------|------------------|-----------------------|-------------------|--------------|
| 2014 | 112350           | 6 318 000             | 78                | 6            |
| 2015 | 11029661         | 28 872 000            | 81.2              | 9            |
| 2016 | 18698512         | 76 792 000            | 88.3              | 35           |
| 2017 | 20296003         | 145 422 000           | 94.2              | 64           |
| 2018 | 33834331         | 881 889 000           | 94.1              | 64           |
| 2019 | 40780000         | 950 000 000           | 94                | 67           |

To build a multi-factor regression model, it is necessary to select factor features, and to identify multicollinearity, it is necessary to analyze the coefficients of pair correlation between factor features. Table 7 presents the coefficients of pair correlations calculated using the application information package.

Table 9. Correlation matrix.

|     | Y          | X₁        | X₂        | X₃        |
|-----|------------|-----------|-----------|-----------|
| Y   | 1          |           |           |           |
| X₁  | 0.90988055 | 1         |           |           |
| X₂  | 0.882384498| 0.699734217| 1         |
| X₃  | 0.884337064| 0.749805706| 0.988048016| 1         |

Since $r_{X_2X_3} = 0.988048016 > 0.8$, i.e. there is a multicollinearity phenomenon between the factor signs $X_2$ and $X_3$, then to build the model, we choose the factor sign that has a greater impact on the resultant sign (the factor for which the coefficient of paired correlation with the resultant sign, taken in modulus, is large).

$$\left| r_{YX_3} = 0.884337064 \right| > \left| r_{YX_2} = 0.882384498 \right|$$

Therefore, the factor $X_3$ has a greater impact on the resulting sign $Y$ and it is recommended to leave this factor in the model. Factor $X_2$ has a lesser impact on the effective sign $Y$ and it is recommended to exclude it from the model, which is fully consistent with the economic meaning of the indicators – increasing the number of destinations will give a greater influx of passengers and will increase the company’s profit.

4. Results

Thus, to build a multiple regression model, two factor signs are selected $X_1$ (cost of fixed assets) and $X_3$ (number of destinations).

Then the multiple regression equation is:

$$Y = 10422787.23 + 0.020578707 \cdot X_1 + 124098.9049 \cdot X_3$$

Let’s evaluate the quality of the constructed multiple regression model according to the following indicators:

the R Square $R^2 = 0.96358266$ is quite close to 1, therefore, the quality of the model can be recognized as high, and the model can be used for practical purposes;

when checking the significance of the regression model, we will use F-test. Since $F_{calc} = 26.45944 > F_{crit} (a = 0.05; k_1 = 2; k_2 = 3) = 9.552094496$, therefore, the regression equation is recognized as statistically significant and can be used to analyze and predict economic processes.
We will estimate the quality of the constructed multiple regression model using elasticity coefficients, $\beta$- and $\Delta$-coefficients.

The coefficient of elasticity is calculated by the formula:

$$\varepsilon_i = b_i \cdot \frac{X_i}{Y}$$

(1)

where $\bar{X}_i$ is the average value of the corresponding factor sign;
$\bar{Y}$ – the average value of the resulting signs;
$b_i$ – regression coefficients of the corresponding factor signs.

The coefficient $\beta$ is calculated by the formula:

$$\beta_i = b_i \cdot \frac{\sigma_{X_i}}{\sigma_Y}$$

(2)

where $\sigma_{X_i}$ is the standard deviation (SD) of the corresponding factor sign;
$\sigma_Y$ – the standard deviation (SD) of the resulting attribute;

The coefficient $\Delta$ is calculated by the formula:

$$\Delta_i = b_i \cdot \frac{r_{YX_i}}{R^2}$$

(3)

where $r_{YX_i}$ is the coefficient of pair correlation of the effective and corresponding factor signs; $R^2$ – the R Square.

The results of the corresponding coefficients are presented in table 10.

|       | $Y$      | $X_1$    | $X_3$    |
|-------|----------|----------|----------|
| Mean  | 20791809.5 | 348215500 | 40.83333333 |
| SD    | 14813523.78 | 442859363.8 | 28.35077894 |
| $\varepsilon_i$ | 0.344647 | 0.24372 |
| $b_i$  | 0.020578707 | 124098.9049 |
| $\beta_i$ | 0.615213 | 0.237506 |
| $r_{YX_i}$ | 0.90988055 | 0.884337064 |
| $\Delta_i$ | 0.019431821 | 0.980568 |

Partial coefficient of elasticity $\varepsilon_i$ shows the percentage change of the average value of the resultant indicator if the average value of a particular factor sign changes by 1 %, i.e., increasing by 1% in the value of fixed assets ($X_1$) the volume of proceeds will increase by 0.34% ($\varepsilon_1 = 0.344647$), with an increase in the number of destinations ($X_3$) the volume of revenue will increase by 0.24% ($\varepsilon_3 = 0.24372$).

The coefficient $\beta$ shows by what amount the effective indicator's SD will change if the SD of a specific factor indicator changes by 1 unit, i.e. if the cost of fixed assets ($X_1$) increases by 1 unit, the revenue SD will increase by 0.615213; if the number of destinations ($X_3$) increases by 1 unit, the low-cost carrier’s revenue will increase by 0.237506 units.
The coefficient $\Delta$ shows the specific weight of the influence of a particular factor attribute in the combined influence of all factor attributes on the effective indicator, i.e. the specific weight of the influence of the cost of fixed assets ($X_1$) on the revenue of “Pobeda Airlines” (effective sign) is 2% ($\Delta_1 = 0.019431821$), and the specific influence of the opening of new destinations ($X_3$) on the revenue is 98% ($\Delta_2 = 0.980568$).

To forecast the revenue for low-cost carrier “Pobeda” (the effective indicator) we will use the multiple regression equation, since the quality of this model is recognized as good.

To make a forecast of the effective indicator, it is necessary to calculate point forecasts of factor signs (the cost of fixed assets and the number of destinations). To do this, we will build graphs $X_1(t)$, $X_3(t)$ and a trend for each of the factors.

![Figure 2. Building a forecast for the cost of fixed assets ($X_1$).](image)

$X_1(t) = -422891570279.67 + 209888314.3 \cdot t$

The predictive value of $X_1 (pred) = 1082824600$ rubles.

![Figure 3. Building a forecast of the number of destinations ($X_3$).](image)

$X_3(t) = 14.25 \cdot t - 28709$

The predicted value of $X_3 (pred) = 76$
The predicted revenue value of Pobeda's revenue is:

\[ Y(\text{pred}) = 10422787.23 + 0.020578707 \cdot X_1(\text{pred}) + 124098.9049 \cdot X_3(\text{pred}) \]

\[ Y(\text{pred}) = 42137434.37 \text{ (rubles)} \]

For an interval forecast of the resulting indicator, it is necessary to calculate the width of the confidence interval, which is calculated by the formula:

\[ U(k) = S \cdot t \cdot \sqrt{1 + \frac{1}{n} + \frac{(Y(\text{pred}) - \bar{Y})^2}{\sum(Y - \bar{Y})^2}} \]  
(4)

Standard error \( s = 3261056.459 \)

\[ T \text{ Test} (\alpha = 0.05; k = 3) = 3.182446 \]

\[ U(k) = 11659625.35 \]

Based on multiple regression, the predicted revenue value of the “Pobeda” air carrier will be in the range of \(30477809.01\) rubles up to \(53797059.72\) rubles.

The models show that air transportation markets are subject to pronounced seasonal fluctuations, but the influence of seasonality on the volume of low-cost flights is much less. This fact makes it possible to effectively launch new low-cost airlines regardless of the season.

5. Conclusions

Budget air carriers occupy a significant share in the market of transport services when the length of one flight is short. But over time, the geography of flights has expanded, and domestic airlines go beyond the borders of their state. Low-cost airlines are reaching a higher level in terms of quality of service and expansion of flight route boundaries in order to compete with large network air carriers. In Europe, the share of low-cost airlines in the total traffic is about 40%, since the distances between countries are relatively short and the demand for air travel among the population is high. Despite the fact that the longest domestic direct flight in the Russian Federation is about nine hours, as it has a long route, the budget airline “Pobeda” competes in the global aviation market. The success of budget business models in the air transportation market is due to a number of factors: reduced costs; intensive operation of aircraft; staff optimization; high rates of seat occupancy in the cabin; new aircraft.

The low cost of a boarding ticket is due to the increased capacity of the cabin, adding additional seats to the cabin, reducing the specific cost per seat by an average of 2%. New modern aircraft have high fuel efficiency and can perform more flights, carry more passengers, and the airline can get more revenue. A number of services are not available from low-cost airlines or can be purchased for an additional fee, but many passengers do not use these options and purchase a ticket at an economy fare. Meals on board the aircraft are not included in the ticket price, and most often passengers do not pay extra for the service. Therefore, you can reduce the staff of flight attendants, and reduce the costs associated with the payment of wages. The optimization of the staff allows you to reduce the time for cleaning the cabin of the aircraft if there is no rear pocket on the back of the seat.

The efficiency of our low-cost airline is provided by such factors as:

- Intensity of use (14 hours in the air per day for 1 aircraft)
- Fuel economy (aircraft relief by 1.5 tons, taxing technology on one engine- saving 100kg of fuel per flight)
- Savings on staff (5,000 passengers per employee with a global average of 1,000) (Aeroflot group website - http://ww.aeroflot.ru/)

The company also sells tickets independently on the website.

Low-cost airlines are most popular in regions where population density is high, but people have the money to travel. At the initial stage of its existence low-cost airlines limited their services to maximize savings and attract more passengers. Now low-cost airlines, while remaining in the niche of budget airlines, can provide services for an additional payment to business class passengers.
Within the framework of international cooperation in the field of air transport between the Russian Federation and Uzbekistan, negotiations are underway on the creation of a Russian-Uzbek low-cost air carrier for the transportation of passengers and cargo.

As part of its strategic development, the group of companies “Aeroflot” is ready to transfer the main medium-haul routes to the Russian low-cost airline “Pobeda”, which will force competitors to reduce tariffs on these routes. But the main credo of budget airlines does not change demand is stimulated by the supply of cheap air tickets.

References
[1] Mal’cev A and Matveeva A 2018 Mezhdunarodny’e passazhirskie aviaperevozki: determinanty’ vzry’vnogo rosta Upravlenec 9 26–31 (in Russian)
[2] Sobolev L 2018 Rossiya na mirovom ry’nke passazhirskich perevozok E’konomicheskij analiz: teoriya i praktika 17 2027–2042 (in Russian)
[3] Southwest Airlines Income Statement: https://investing.com/equities/sth-west-airlines-income-statement
[4] Ryanair Income Statement: https://investing.com/equities/ryanair-hldgs-income-statement
[5] Financial statements, balance sheet Airlines “Pobeda” (in Russian)
[6] Passenger traffic at Russian airports: https://www.avia-adv.ru/en/placement/airports/passenger-traffic.htm
[7] Kuzneczova E 2016 Polety’e’konomicheskogo klassa Kommersant. Aviastroenie. Prilozhenie 103 14-15 (in Russian)
[8] Sovet direktorov utverdil strategiyu razvitiya gruppy “Aeroflot” do 2028 goda: https://www.aex.ru/news/2020/7/16/214746/ (in Russian)
[9] Melekhina T and Palamar’ E 2016 Analiz vozmozhnosti razvitiya rossijskogo ry’nka loukosterov Nauchny’e trudy’ Vol’nogo e’konomicheskogo obshestva Rossii 2 179-188 (in Russian)