

Contemporary Civil Aviation Market: Seeking an Economic Niche for the Russian Products

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Abstract—The paper covers an important theme of the development of one of the basic industries of the Russian economy – the civil aviation production. The current situation in the Russian industry leaves much space for the development, as at the current stage, the stagnation, caused by the USSR fall has not yet passed. The article's main aim is to develop a clear vision of the market conjuncture of the Russian industry and to reveal the main prospects of its future development taking into account the development of the new products by the Russian aviation corporations and Russia-China joint project. The article contributes to the estimation of the Russian aviation industry potential.

Keywords—Russia; aviation; industry; projects; Sukhoi Superjet-100; MC-21

I. INTRODUCTION

Civil aviation is one of the biggest and fast developing markets in the world. Globalization and the need for faster transportation resulted in the growing demand for different types of air carriers [1]. The global market today is dominated by Boeing and Airbus in all its segments, while other producers, such as Embraer, Bombardier CR and the numerous producers of business jets and non-passenger private airplanes stand aside from the main market revenues.

The development of the aviation in Russia forced the country to start the process of modernization of its industrial standards and regulation, as a result, the development of the national production of the aircrafts (basically, the revival of the Soviet technologies and manufacturing chains) becomes one of the national priorities in the sphere of transport.

Still, the process of developing the industry or even a single product in aviation is very expensive, so the economic impact of the production of these products should be much more significant than the costs necessary for its development. In the sphere of aviation production, the economic proficiency is reached by acquiring contracts with air transport companies, which are quite often national carriers, by preordering the airplanes at the product development stage and preproduction, and by the expected serious rise in contracts with the foreign companies, so that the airplane development proves to be economically effective [2].

For Russian industry, the competition on the market is too high to consider a significant market share conquest, but the aircraft industry is strategic. Hence, the article is devoted to

assessing the trends in the Russian aircraft industry and the analysis of the comparative advantages of the Russian newly developed projects in the sphere of aircraft production (Sukhoi Superjet-100, Irkut MC-21 and the common Russia-China project CR929) with the most popular aircrafts of the same characteristics.

II. METHODOLOGY

The article is based on the methodologic approach of research of the market conjuncture in the economic sphere on the national market of the country-exporter, which contributes to the understanding of the key institutional characteristics of the industry and the development of the general strategy. The second step is the research of specific products based on the comparative analysis of their characteristics by the parameters pointed out in the comparison.

In order to assess the market conjuncture and dynamics the authors have researched timeseries of the passenger transportation and counted the growth ratio on this indicator for world and for Russia. The results of the analysis allow to draw a conclusion about the dynamics of the industry in Russia and globally.

The authors introduce a security index (*SI*) in the process of comparing SSJ-100 with its competitors. The index looks the following way (1):

$$SI = AL/AP * (VN+1)/EY \quad (1)$$

where *AL* – aircraft losses, *AP* – the number of aircrafts produced (this part is a general index for fatal errors estimation), *VN* – the number of victims in all the crashes onboard, *EY* – the number of years the airplane was in exploitation. The second part of the index allows to estimate the average passenger risk – knowing the number of years the plane was exploited the number of passengers onboard can be approximately estimated. The addition of 1 to the victims' number allows to avoid multiplication by 0, when there were no victims without the statistically significant change.

The analysis allows to give conclusions on the SSJ-100 and other Russian aircrafts' niche on the market.

III. THE GENERAL TRENDS IN THE RUSSIAN AIRCRAFT INDUSTRY

The aircraft industry in Russia is highly dependent on the previous tracks of its development in the Soviet era. The contribution of the Soviet technologies in the current development level of Russian aviation is extremely big. In addition to that, many institutions have been preserved since that time and now path dependence can be clearly proven on the example of the aviation industry in Russia [3]. The main characteristics of the contemporary Russian market are the following:

- 1) High dependence on national carriers. The aircraft manufacturers gain main contracts from the leading national transport companies and the companies of the CIS, as the foreign markets in aviation are subject to both economic and political influence. The economic influence arises from the fact that the main consumers of the aircrafts are situated in Europe, Asia and America, where the local players, mentioned above, play a leading role on the market and can provide cheaper service and easier access to spare parts. The political aspect is explained by the fact that every country, which produces aircrafts, lobbies for them in the national carrier companies, and even foreign companies – as the industry is crucial for the economic development, the “aircraft diplomacy” has become another instrument of international politics.
- 2) High dependence on state and government finance. The transformation of the aviation market in Russia followed the path of non-liberalization and centralization under the state-owned corporations, such as OAK (96% state-owned); the same tendency is observed in the sphere of carriers – the biggest of them, Aeroflot, S7, Utair, are partially state owned (in case of S7) and have a leading role of state in the structure of their shares (the other two mentioned) [4].
- 3) The projects in the aircraft industry are considered as the projects of special importance and hence controlled by the government authorities. In order to prove the successfulness of the project, the Government insists on the proliferation of nationally produced aircrafts share in the fleet of the leading companies.
- 4) The production of the aircrafts, which will use only Russian technologies is impossible due to the lack of innovations in the sphere in Russia, so the producers are forced to refer to the foreign components - the process is not that effective, but the sanctions against Russia make it even more difficult [5].

These tendencies lead to the decrease in the quality and the consumer characteristics of the Russian aircrafts. In addition to that, the national transport market is in a state of turbulence, as the economy of Russia cannot find a balance for sustainable growth. In this regard, the development of the aircraft production industry is under high pressure from the economic and political factors, which as a result lead to the stagnation of the key national products in this sphere.

There is a positive correlation between the demand for logistic services on a monopolistic market and the production of these products, the aircraft production industry in Russia falls under this dependence too. The research of the possibilities of the sustainable development of the aircraft production industry, considering the mentioned points, should be based on the passengers and cargo transportation analysis and forecast (Fig. 1). Still, for Russia the volumes of aero transportation of cargo are far less significant than those of passengers and follow the general trend of stable but slow growth.

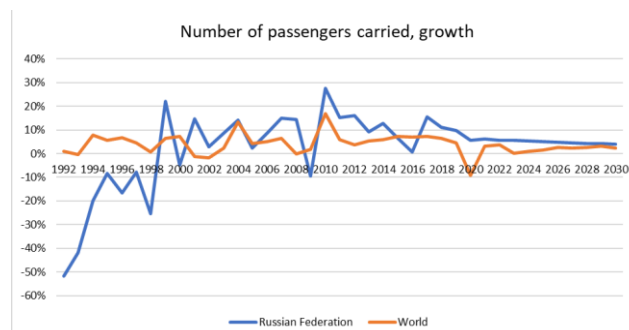


Fig. 1. The growth of passenger transportation in Russia (%) (forecasted by the authors, based on [6]).

The results of the forecast, presented in Fig. 1, demonstrate the volatility of the Russian passenger transportation market with a general dynamic for a slight decline in the growth rate in the forecasted period (2019–2030), while the global dynamic in the forecasted period demonstrates a stable growth tendency.

In this regard, the economic factors do not stimulate the development of the Russian aircraft production industry, the main creditor of this sphere of economy is the Russian budget. In addition to that, there are significant difficulties assessing the effectiveness of those investments, especially in the sphere of scientific research and innovative products development. Hence, the niche of the Russian aircraft sales is limited by geographical and political borders to the regions, where:

- There is no regional or national aircraft manufacturer.
- The counterpart should not have joined the anti-Russian sanctions and does not support the American critical rhetoric on Russia.
- The country has the need for a large number of short-range aircrafts (for now, MC-21 is still in work, so the only available option is SSJ-100).

The next step for finding a niche for the Russian production of the airplanes is the analysis of the analogs of the Russian machines and comparison of the named aircrafts with them.

IV. THE COMPARISON OF THE NEW RUSSIAN AIRCRAFT PROJECTS WITH THEIR ANALOGS

The comparative analysis by technical characteristics can be held only for the SSJ-100, as it went into series, while the other two projects are at the stage of development and testing, so the comparison for them will be held empirically. The main

competitors for the SSJ-100 (both versions 95 and 95LR) are the passenger carriers with the passenger number of 100–140, in this article the main competitors are Airbus 319, Boeing-737-700 (7 MAX), as these aircrafts are the most massively sold in the segment, while the production of Bombardier (CS100 and CS300) and Embraer (E190 and E195) are more regionally distributed [7]. The comparison of the key technical and economic characteristics is presented in Table 1.

The authors have developed several indexes allowing to compare the aircrafts. The passenger cost index allows to estimate the costs of transportation of a passenger in case of a maximum payload, maximum distance and 100% amortization, which in real life cannot be achieved; the weight cost index does the same for 1lb weight, while the security index allows to estimate the percentage of losses and victims ratio.

TABLE 1. THE COMPARISON OF SSJ-100 WITH ITS MAJOR COMPETITORS (DEVELOPED BY THE AUTHORS, BASED ON [7–9])

Characteristic	SSJ-100LR	Airbus 319-100	Boeing 737-700	CS100	E190
Seating number (2-class)	87	136	140	100	98
Range (NM)	2470	3700	3445	2950	2372
NCS (Mach)	0.78	0.78	0.785	0.78	0.78
Ceiling (ft)	40,000	41,000	41,000	41,000	41,000
Runway length (ft)	>5679	>5226	>5500	>4950	>6745
Maximum payload (lb)	26,995	36,635	38,700	32,100	28,800
Price (million \$)	35	85.8	74.8	76.5	60.8
Number of incidents (incidents/victims on board/since year) since the beginning of exploitation	5/86/2008	12/0/1994	5/1/1993	7/0/2013	7/77/2001
Passenger cost index (\$ per 1 passenger per 1 NM)	162.874	170.501	155.09	259.32	261.555
Weight cost index (\$ per 1lb of weight per 1NM)	0.525	0.633	0.561	0.808	0.89
Number built	172	1480	1749 (average of 6996 of 737 NG)	90	1521
Security index	0.2272	0.0003	0.0002	0.013	0.0197

The analysis of Table 1 allows to conclude that the aircraft by Sukhoi provides a better price/load ratio, which allows to conclude that the aircraft is competitive by its technical characteristics, especially for the companies with operative structure optimization and average short routes. At the same time, the security index is dramatically high.

As for the MC-21, its main competitors are Airbus A320neo and Boeing 737 MAX 7; by preliminary data, the aircraft will be positioned as a cheaper analog of these aircrafts in pursue to conquer the market. At the initial stage of the preorders for the aircraft, the numbers are not impressive and correlate with the SSJ-100 results, so the future of the aircraft on the global market is similar to the SSJ-100, with corrections on its reliability [10].

The other situation is with the CR-929 project, which will be offered to the Chinese market [11]. The development of this aircraft will boost the orders for the previously mentioned airplanes in Asia, as the Asian countries have the demand for cheaper air transportation and locally manufactured and supported aircrafts, the exploitation of which does not depend on the relations with the European states and the USA.

V. DISCUSSION

Hence, the economic niche of the SSJ-100 is highly doubtful in the authors' opinion. The extremely high risks do not allow to make a conclusion about the future possibilities of exploitation of the plane without a general revision of the concept and the mechanisms of the aircraft. Further, its high economic indicators allow to conclude that the future of the plane with major security issues solved is quite prosperous. The niche is reviewed based on the assumption that the security problems are solved.

The economic efficiency allows SSJ-100 to operate in all companies, regardless of their price strategy, especially on the high passenger or freight flow routes. With the low cost of the aircraft, compared to its competitors, especially for the Russian exporters, which plan to acquire long run servicing contracts, the SSJ-100 is the chance to change the situation in the industry in some countries.

The main barrier for the penetration of the SSJ-100 on the market is the fact that Sukhoi has no goodwill in the countries, aside from CIS, so the main supply of the SSJ-100 is expected to happen to the former USSR countries, and the massive promotion of the aircraft on the international airshows will contribute to its further market penetration. Hence, the major niches for the plane are:

- lowcoster airlines, with no regard of their domestic region;
- short-range flight companies (majorly in the Eastern Europe);
- CIS companies;
- Russian companies forced by the Russian government institutions.

The economic niche for MC-21 is unclear, however, it is highly likely that it will be the same as for SSJ-100, but with the route distance change, still the airplane seems to be of higher quality (at least, at the current stage) [12] and may find a wider niche. The niche for CR-929 is clear – it is the Asian and Russian markets, with no regard to the company's pricing policy and further regional proliferation of the aircraft to the neighbor regions' markets.

VI. CONCLUSION

The Russian civil aviation market today is in a state of decay, as the measures, implied by the Russian government authorities and the companies, functioning on the market make it uncompetitive and oligopolistic. The future of the market is seen through the prism of the development of the new aircraft models, which may help satisfy the local and regional needs for the aircrafts of all classes. Meanwhile, the growth of the global market exceeds the growth of the Russian market of air transportation, so the effectiveness of the Russian market is

doubtful. The liberalization of the sphere is needed and the introduction of the antimonopoly measures will be welcomed by the market, but because of the character of the market institutions (conservative, inherited from the planned economy of the USSR) the market changes are unlikely.

The comparison of the new products of the Russian aviation industry with their foreign analogs allows to conclude that the industry in Russia has significant prospects, but cannot fully realize them, as in order to produce reliable and competitive aircrafts it is forced to refer to Western technologies and develop a better institution of security and reliability control of its products.

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