KAPITEL 2 / *CHAPTER 2* [2]

EVOLVING DYNAMICS AND STRATEGIC APPROACHES IN UKRAINE'S AVIATION INDUSTRY WITHIN THE GLOBAL MARKET FRAMEWORK

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Introduction

The aviation industry is inherently global, as the demand for it spans across borders. Economies of scale are significantly realized in the production and operation of aircraft, making the market for aviation technical services a transnational affair. Therefore, it's essential to analyze this market with respect to global trends in air transportation demand and aircraft manufacturing developments.

The aviation industry is distinguished by its technological complexity, high added value, continuous innovation, and strategic importance. It's viewed by countries as a matter of national interest, serving both economic goals and security objectives. The development of this industry requires substantial investments in research, engineering expertise, and specialized, costly assets, along with advanced managerial skills. This has led to a competitive aviation industry in only a few countries, heavily dependent on government and political support. Consequently, a deep analysis of both the global and Ukrainian aviation markets is necessary to formulate recommendations for further development of the domestic aviation industry. The characteristics and trends of the Ukrainian aviation market have been studied by researchers such as A. Vovnyanko, A. Guk, S. Podrez, and V. Romanyuk, while the global market has been examined by S. Erikson, M. Zhegu, S. Mac Ghir, J. Niosi, G. Stinhus, among others. However, the pressing issue remains the development of a strategy for the domestic aviation industry, taking into account existing trends in both the global and Ukrainian markets, as well as the current political and economic situation.

Evolution and Strategic Directions of Aviation Industry

Aircraft manufacturers operate in an atypical oligopolistic market, where their productivity depends on both corporate strategy and government policy. The industry is highly concentrated, with 34% of aviation companies emerging from the USA, 13% from the UK, 10% from France, and 9% from Germany throughout the 20th century. These countries, along with Italy, Canada, Australia, the USSR, and Japan, formed

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81% of the world's aviation companies. For many years, the commercial jet aviation market was essentially a duopoly between European manufacturer Airbus and American Boeing, sharing about 65% of the global aircraft fleet. Today, nearly the entire volume of global deliveries is provided by four companies. Airbus and Boeing dominate the medium and large aircraft segments, while Bombardier and Embraer lead in the small aircraft segment. Research in the industry is also concentrated, with eight countries (USA, UK, Germany, France, Canada, Japan, Sweden, and Italy) owning 98.2% of patents, the USA alone holding 75%. In the coming decade, competition is expected to intensify in all segments, with China and Japan (notably Mitsubishi) emerging as leading investors in this sector. The global aerospace and defense industry is predicted to grow by 3.0% in 2024 after a revenue decline of 3.2% in 2023, 1.9% growth in 2022, and a 0.5% decrease in 2021.

Air travel is increasingly popular worldwide, driven by rising prosperity and simplified visa processes. For instance, in Europe, aviation contributes to 4.1% of GDP and supports approximately 12.3 million jobs. Globally, around 3.2 billion passengers used air transport for business and tourism needs in 2024, marking a growth of about 5% compared to 2023. From 2022 to 2024, the annual global demand for air transportation is projected to grow by an average of 4-5%. The number of aircraft departures worldwide reached 33 million in 2024, surpassing the 2023 figure significantly. This growth in global regular passenger traffic, which increased by 5.9% in 2024 compared to an average of 5.6% over the last decade, can be attributed to global economic growth and improvements in world trade.

Over the last 30 years, passenger traffic has quadrupled, growing at an average annual rate of 5.3% since the 1970s. This growth is due to the development of new markets and a more equitable distribution of wealth globally. Two decades ago, 70% of the world's population held less than 10% of global wealth. Today, this figure is around 20%, and it is expected to exceed 30% in the next 20 years. Consequently, whereas 20 years ago, 70% of the world's population accounted for less than 10% of air travel, they now account for 20%, and this is expected to rise to 30% in the next two decades.

Since 2001, despite experiencing two of the worst downturns in the commercial aviation industry, the volume of air traffic, measured in Revenue Passenger Kilometers (RPKs), has increased by 85%. This growth is attributed to factors such as the emergence of economies in developing countries, tourism, and liberalization, all of which will continue to drive traffic growth. RPKs are expected to double in the next

fifteen years, increasing by 145% to reach 15.2 trillion by 2034. Significant growth in both inbound and outbound traffic is forecasted for the most mature markets, particularly between Western Europe and the USA, with an increase of 1.7 times over the next 20 years. Domestic flights within China are anticipated to become the largest transport stream, almost quadrupling in volume, necessitating larger aircraft due to demographics and traffic density. International long-haul traffic is expected to grow faster than domestic and short-haul international traffic, with an annual growth rate of 4.7% and increasing its overall traffic share to 45%.

Ukrainian experts highlight the following global aviation trends: 1. Rapid development of aviation in the East; 2. China's aviation market has already surpassed the USA's and is now the largest in the world; 3. The European Union's policy is geared towards maximum liberalization of the internal environment, which has significantly increased the volume of air travel and strengthened the positions of leading EU carriers.

The demand in the aviation industry is being met by increasing the number of aircraft equipped with the latest technologies and airlines' efforts to maximize efficiency by filling every available seat (currently, the average load factor is about 80%). The projected sales volume of commercial aircraft between 2011 and 2030 is estimated at 33,000 units, with a total value of 4 trillion USD. Approximately 75% of these sales will be passenger aircraft with over 100 seats, while cargo aircraft will only account for about 6% of the total.

Key global trends in the aviation manufacturing industry include:

An increase in the global demand for aircraft. It is forecasted that about 80% of this demand by 2030 will be concentrated in countries belonging to the Organisation for Economic Co-operation and Development (OECD) and in the Asia-Pacific region. In the first group, the demand for air travel will not rise sharply, but airlines will replace older and less efficient aircraft. Meanwhile, in the second group, the demand for aircraft will be driven by an increase in transportation, passengers, and cargo.

The renewal of the existing aircraft fleet is driven by: 1) The aging of aircraft and the need to reduce operational expenses (such as fuel, training, maintenance, and repair), leading to increased demand for newer, more efficient models. Modern aviation construction requirements by 2025 include reducing fuel consumption by 20% and significantly decreasing aircraft weight; 2) The demand for larger aircraft due to the need to decrease airport congestion and the growth in demand on existing routes; 3) Environmental protection requirements, which necessitate replacing older, less efficient aircraft with newer, more eco-friendly models.

Expansion of the existing fleet is stimulated by: 1) The growing demand for air transportation; 2) The emergence of new low-cost carriers, which boosts demand for passenger travel; 3) Liberalization on certain routes, potentially leading to the formation of new airline networks, intensifying competition, reducing prices, and increasing demand on these routes.

The demand in the aviation industry is increasingly diversifying geographically, shifting towards the Asia-Pacific region. Over the next 20 years, it's anticipated that an increasing number of people from developing economies, particularly in Asia, Africa, and Latin America, will become consumers of aviation services. They are expected to predominantly use smaller, single-aisle aircraft like the A320 and 737 families. In the next two decades, around 70% of new aircraft deliveries will belong to this class. For long-haul journeys, large aircraft such as the A330, A350, and A380 will continue to be the preferred choice. Sales of twin-aisle aircraft will represent about a quarter of the volume of new deliveries but will account for 44% of their value. Very Large Aircraft (VLA) such as the A380 will have the smallest share of deliveries – 5%, but in the future, they are expected to be the most efficient way of transportation to key global destinations.

Air cargo transportation is projected to grow by 4.4% over the next 20 years, a trend driven by the development of emerging markets. This will lead to increased demand for cargo aircraft, both new and converted from passenger planes. However, the advent of new types of wide-body passenger aircraft may worsen the situation for cargo aircraft manufacturing.

The competition in the aviation industry is set to intensify with the entry of new market players. The rising demand for aircraft is fostering competitive development in aviation manufacturing. In the small aircraft segment (100-seaters), new entrants include the Russian-Italian SuperJet 100, the Chinese Comac AR/21, the Japanese Mitsubishi MRJ, and Ukraine's Antonov with the An-148/158. In the 100-150-seat segment, Embraer with its E-190/195 and Bombardier with the CS100 and CS300 are actively competing with Boeing and Airbus. In the segment of aircraft with over 150 seats, the Airbus-Boeing duopoly is expected to face competition from Russia's Irkut MS-21 and China's Comac C919, anticipated in 2024.

However, for developing countries, including Ukraine, the outlook is bleak. Dozens of developing countries have attempted to enter the aviation manufacturing sector without success. Entry into this industry requires substantial design and production capabilities. The institutional environment plays a critical role in the

industry's assimilation by new countries. Only Brazil has successfully created such an environment, and China is following its lead. The Chinese corporation 'Comac,' established in 2009, is rapidly developing. By 2025, the company aims to capture 10-15% of the global market.

The aviation manufacturing sector evolves slower than other economic sectors, with new products emerging at an average rate of two per decade. Implementing progressive approaches by new market entrants takes much longer and is more complex compared to other industries. This is due to significant variations in aircraft demand, the need for massive capital investments, and a long payback period, which demotivates private investors. High safety certification standards require the production of high-quality products right from market entry. Consequently, the cycle of industry delocalization towards developing countries, which took three decades in the field of computer software, might take an entire century in aviation manufacturing.

China, Japan, and Russia have utilized different strategies to enter the aviation manufacturing market. China and Russia consolidated their research capabilities in national leaders (UAC in Russia, AVIC in China), while Japan entered the market through production collaboration with Boeing. However, as noted by C. MacGir, displacing the existing market leaders will be exceptionally challenging due to their experience with international safety standards, broad innovation capabilities, and significant R&D expenditure.

While economic, political, and strategic factors influence aircraft purchases, the focus is on minimizing the total cost of ownership. Over the last 30 years, operational expenses have replaced technology level as the key factor in airlines' aircraft purchasing decisions. Consequently, global manufacturers have adapted their strategies, now promoting cost-effective aircraft features rather than purely technologically advanced ones. Airlines and leasing companies primarily consider the total cost of ownership when purchasing aircraft, including acquisition price, operational, and financial expenses. Currently, the purchase price accounts for only 20-40% of the total cost. Operational expenses, including fuel, maintenance, and repair costs, are the critical factor in purchasing decisions. In response, many manufacturers offer integrated solutions, encompassing both production and technical maintenance.

Globalization of supply chains in the industry. Engineering processes, production, and post-sales services in the industry are integrating on a truly global scale. For instance, Airbus has established multinational cooperation in Western Europe, and Boeing in Japan. This occurs for various reasons: 1) Manufacturers can leverage

differences in productivity, workforce expertise, and costs on a global scale. With the growing importance of customers from BRICS countries (Brazil, Russia, India, China), globalization offers access to these markets. The opening of post-Soviet countries, the reduction of trade barriers, and the lower cost of communications also facilitate globalization; 2) Many processes (design, integration, coordination), previously offered only by manufacturers, are now executed by leading suppliers, enabling the minimization of development costs and the distribution of risks.

In Ukraine, the aviation sector, despite being strategic, is not actively developing. In 2014, the domestic aviation transport sector experienced a decline due to worsening economic and military-political situations in the country, compounded by recommendations from various international organizations and EU bodies to avoid parts of Ukraine's airspace. While global airlines increased passenger traffic by 5.9% in 2014, Ukraine saw a fall in demand for air transportation, driven by a decrease in the population's purchasing power. Recent adverse events (the annexation of Crimea, the Malaysian Airlines Boeing disaster) further exacerbated the situation. Airports in Donetsk and Luhansk are non-operational, and Crimea’s airports are beyond Ukraine's effective control. Domestic and foreign airlines have reduced or canceled flights, leading to a decrease in the number of flights in Ukrainian airspace.

In the first half of 2015, 31 Ukrainian airlines carried out passenger and cargo transportation, executing 31.1 thousand commercial flights. The number of passengers carried decreased by 8.5% compared to the same period in the previous year, totaling 2,730.9 thousand people. The volume of cargo transportation also decreased by 8.4%, amounting to 32.9 thousand tons.

During the COVID-19 pandemic, air traffic in Ukraine experienced a significant reduction, mirroring the global trend. This decline was due to travel restrictions, lockdowns, and decreased travel demand. Ukrainian airlines faced severe financial challenges, with reduced passenger numbers forcing them to adjust operations, cut down on flights, and furlough staff. To mitigate the spread of the virus, airports and airlines implemented stringent safety measures, including mandatory mask-wearing, social distancing, and enhanced cleaning. As restrictions eased, there was a slow recovery in air traffic, but this recovery was uneven and deeply influenced by the evolving pandemic situation.

The situation further deteriorated with the escalation of the conflict with Russia. The Ukrainian airspace was closed to civilian air traffic, leading to the suspension of commercial air services. The conflict caused significant damage to airport

infrastructure, further disrupting an already strained aviation sector. While commercial services were largely suspended, the airspace was occasionally used for humanitarian and evacuation flights. The conflict's economic impact on Ukrainian airlines and airports compounded the financial strain already experienced due to the pandemic. This had a ripple effect across the European region, with airlines rerouting flights to avoid Ukrainian airspace, resulting in longer flight times and increased operational costs.

Since 1992, Ukraine has been actively integrating into the global air transport community. This integration has been marked by Ukraine's membership in several prominent international aviation organizations. Ukraine became a member of the International Civil Aviation Organization (ICAO), a specialized agency of the United Nations that establishes international air navigation principles and fosters global air transport development, on September 9, 1992. Subsequently, Ukraine joined the European Civil Aviation Conference (ECAC) on December 15, 1999. ECAC is an intergovernmental body committed to enhancing the safety, efficiency, and sustainability of the European air transport system.

On May 1, 2004, Ukraine also became part of Eurocontrol, an international organization dedicated to safe and efficient air traffic management across Europe. Beyond these memberships, Ukraine is bound by numerous international commitments, being a signatory to 39 international air law treaties. This includes agreements under the auspices of ICAO, ECAC, and Eurocontrol, in addition to 66 bilateral intergovernmental air service agreements and the "horizontal agreement" with the EU concerning specific aspects of air services. These memberships and treaties underscore Ukraine's dedication to conforming with global civil aviation standards. They facilitate Ukraine’s participation in the international aviation community, allowing the establishment and maintenance of air connections globally, and aligning Ukraine's aviation safety, security, and environmental compliance with international standards.

In 2015, on July 14th, Ukraine and the United States established a new aviation agreement, known as the "Open Skies" treaty, superseding the prior air transport agreement between the two nations dated back to June 5, 2000. Preceding this significant development, Ukraine had secured a Category 1 rating from the U.S. Federal Aviation Administration (FAA) on September 19, 2013. This prestigious rating was awarded following a comprehensive FAA audit that affirmed Ukraine's adherence to the International Civil Aviation Organization (ICAO) standards.

Looking ahead, the trajectory of Ukraine's air transport sector is poised to be

shaped by the efficiency of its state regulatory mechanisms. This regulatory landscape is underpinned by the Air Code of Ukraine, alongside a suite of laws encompassing natural monopolies, transportation, and the licensing of business activities. A key strategic objective for Ukrainian state policy in aviation is to ensure its regulatory and legal frameworks are in sync with the evolving international standards set by influential bodies such as the EU, ICAO, ECAC, and Eurocontrol.

These initiatives underscore Ukraine's endeavors to align with global aviation practices and to foster deeper aviation ties internationally. The establishment of the "Open Skies" agreement with the US, coupled with the compliance to ICAO standards as validated by the FAA, signals Ukraine's ambition to enhance its stature in the global aviation arena. The country's commitment to revamping its aviation sector is evident in its efforts to update and harmonize its legal and regulatory frameworks with international norms, ensuring a modern and competitive aviation industry.

Conclusion

Before the conflict with Russia, Ukraine's aviation industry demonstrated substantial potential, standing among a select group of nine countries globally capable of completing the entire technological cycle of aviation equipment creation and production. The country had successfully developed and certified several civilian aviation models, such as the AN-148 and AN-158, which were competitive on the global stage.

Up until the beginning of 2022, Ukraine boasted 38 organizations with valid Aviation Technology Developer Certificates and 32 organizations possessing Aviation Technology Production Approval Certificates. Prominent among these were State Enterprise "Antonov", Kharkiv State Aviation Manufacturing Enterprise, State Enterprise "Plant 410 CA", PJSC "Motor Sich", State Enterprise "Odesa Aviation Plant", PJSC "Aviation Firm 'Lilienthal'", among others. The Ukrainian aviation industry was known for producing a diverse range of aircraft, including transport category aircraft, light and ultra-light planes, helicopters of various categories, thermal aerostats, motorized hang gliders, and paragliders. Primary markets for these products prior to the war included CIS countries, India, Iraq, Iran, Libya, Egypt, Turkey, Cuba, and more.

However, the current landscape of aircraft manufacturing in Ukraine is beset by numerous challenges. The ongoing military conflict, reliance on outdated equipment, financial resource constraints, and the sporadic and limited nature of the domestic

aircraft industry's contributions to the international market are among the key issues. These factors collectively underscore the difficulties faced by Ukraine's aviation sector in maintaining its global market presence and competitiveness.

In conclusion, the combination of the pandemic and the ongoing conflict with Russia has presented unprecedented challenges to Ukraine's aviation sector, impacting everything from air traffic and airline financial health to airport operations and regional air travel. The future of air transportation in Ukraine remains uncertain and heavily dependent on the resolution of the conflict and subsequent recovery efforts.