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REASSESSING THE AVIATION DEVELOPMENT STRATEGY IN UKRAINE

Abstract. *This paper analyzes government policies aimed at supporting the aviation industry in Ukraine and compares them with similar policy instruments implemented in Brazil as both countries maintain full-cycle aircraft manufacturing capabilities and operate within comparable structural conditions in the global aviation sector. The research identifies key state support instruments, including industrial development programs, financial mechanisms, and innovation policies and highlights the need for Ukraine to prioritize the development of Unmanned Aerial Vehicles (UAV) technologies, strengthen the domestic aerospace supplier ecosystem, and establish sustainable long-term funding mechanisms for research and development.*

Keywords: *Aviation industry, aircraft manufacturing, government support programs, national development programs, UAV.*

ПЕРЕОСМИСЛЕННЯ СТРАТЕГІЇ РОЗВИТКУ АВІАЦІЙНОЇ ГАЛУЗІ В УКРАЇНІ

Анотація. У цій статті проаналізовано державну політику, спрямовану на підтримку авіаційної промисловості в Україні, та здійснено її порівняння з аналогічними інструментами політики, впровадженими в Бразилії, оскільки обидві країни зберігають можливості повного циклу виробництва літаків і функціонують у подібних структурних умовах глобального авіаційного сектору. У дослідженні визначено ключові інструменти державної підтримки, зокрема програми промислового розвитку, фінансові механізми та інноваційну політику, а також підкреслено необхідність для України пріоритизувати розвиток технологій безпілотних літальних апаратів (БПЛА), посилити вітчизняну екосистему постачальників аерокосмічної галузі та створити сталі довгострокові механізми фінансування досліджень і розробок.

Ключові слова: *авіаційна промисловість, літакобудування, програми державної підтримки, національні програми розвитку, БПЛА.*

Formulation of the problem. Over the past decades, numerous scientific papers and articles have been published to investigate the challenges of the aviation industry development in Ukraine and to emphasize the importance of this sector for the national economy and regional development. Some of these studies addressed the important issue of coordinating the development of the Ukrainian aviation industry with that of the European Union [1], while others examined the trends in aviation industry development under global challenges [2], highlighting the advantages and disadvantages of organic and inorganic growth strategies. The issue of supporting aircraft manufacturers under complex geopolitical, financial, and technological conditions has also been widely discussed. Several important legislative acts have been adopted by the Government of Ukraine to support the aviation industry. However, despite the existence of multiple government initiatives, the effectiveness and coherence of these policy instruments remain insufficiently studied. Moreover, current circumstances caused by war with Russia have opened new opportunities for Ukraine in the development of UAVs.

Analysis of recent research and publications. This article examines regulatory and legal acts aimed



at strengthening Ukraine's aviation industry since 1992 and compares them with measures implemented by the Brazilian government to support the sustainable, long-term development of its aviation sector and its key aerospace company, Embraer. All state programs for the development of Ukraine's aviation industry have been primarily focused on supporting sectoral enterprises through domestic orders, government investments, and international cooperation, while maintaining restrictions on such cooperation for state-owned "strategic" companies. A substantial body of research exists on the development of UAVs in both military and civilian segments; however, only a limited number of studies have been published within the Ukrainian academic space on this topic. Numerous Ukrainian and international publications have highlighted the rapid transformation of the UAV sector and emphasized its importance both for Ukraine's defense against Russian aggression and for broader global applications. Companies such as Dronamics (Bulgaria), Natilus (USA), and China Aerospace Science and Technology Corporation (China) have developed or are nearing completion of prototypes for unmanned cargo aircraft and are making significant progress toward their certification. For Ukraine, 2026 represents a window of opportunity to expand its expertise and global role in the development of both small and medium-sized unmanned cargo aircraft. This requires the formulation of a comprehensive aviation industry development strategy that takes into account both the country's combat experience and current technological trends.

Purpose of the article. The article is aimed at examining Ukraine's state programs and initiatives for aviation industry development in comparison with international best practices, particularly the Brazilian model of government support for Embraer. It also analyzes the impact of the rapid development of advanced technologies, in particular UAVs, in both military and civilian contexts, highlighting technological advancements and market trends. The study evaluates Ukraine's existing capabilities, expertise, and potential for developing small- and medium-sized cargo UAVs, incorporating lessons from combat experience and global technological developments. Finally, it formulates strategic recommendations for the sustainable growth and international positioning of Ukraine's aviation industry, with an emphasis on niche specialization.

The main material presentation. *State Policies and Regulations Supporting Ukraine's Aviation Sector.* According to a press release "Issues of Aviation Industry Development in Ukraine, published on the Verkhovna Rada of Ukraine website on April 22, 2011, at that time the Ukrainian aviation industry included 20 enterprises engaged in the design and production of complete aircraft and engines, 24 enterprises performing serial production of components, assemblies, and parts for aircraft and engines, and over 50 enterprises from other sectors supplying aviation components. The total workforce across enterprises and research institutions in the sector was estimated at approximately 60,000 employees"[3].

The fundamental system-forming legal act in the aircraft manufacturing sector is the Law of Ukraine No. 2660-III of July 12, 2001, "On the Development of the Aircraft Manufacturing Industry", which defines the status of aircraft manufacturing entities, mechanisms of state support, tax incentives, and the framework for innovation-driven development of the industry[4].

Since 1991, four national programs aimed at supporting the development of the aviation industry in Ukraine have been adopted at the state level.

The first attempt dates back to July 3, 1992, when the "Program for the Development of the Aviation Industry of Ukraine (1992) was approved by Presidential Decree No. 363/92". The program aimed to establish an independent national aviation industry while preserving the production potential inherited from the Soviet Union and facilitating access to global markets [5].

On July 28, 2003, the Cabinet of Ministers of Ukraine adopted "Resolution No. 1174 approving the State Program for Industrial Development for 2003–2011". This program was intended to address issues related to restoring serial aircraft production, establishing a unified aircraft manufacturing complex, improving competitiveness, and developing financial mechanisms for industry support [6].

On July 17, 2013, the Cabinet of Ministers of Ukraine adopted "Resolution No. 603-r approving the Concept of the National Target Economic Program for Industrial Development until 2020". Within this framework, it was suggested that the aerospace and aviation sectors should be examined more closely in separate program documents [7].

Finally, the most comprehensive national program aimed specifically at the aviation industry was approved by "Resolution No. 951 of September 1, 2021, entitled "The State Target Scientific and Technical Program for the Development of the Aviation Industry for 2021–2030". The main objective of the program is to create conditions for implementing innovative research and developing new competitive aviation technologies, materials, production processes, and equipment. The implementation of these initiatives is expected to enable profitable serial production of high-technology aviation products in Ukraine, as well as the development of new competitive models of passenger and cargo aircraft, helicopters, engines, low-noise propellers, aviation simulators, and other equipment, thereby promoting their export to international markets. However, this program was adopted without fully accounting for contemporary realities, including the war and the rapid

development of new technologies and therefore requires thorough reconsideration and adjustment. One aspect that can be stated with confidence is the necessity of continuing the implementation of item 5 of the program, which focuses on strengthening social and human capital [8].

Table 1

National programs aimed at supporting the development of the aviation industry in Ukraine

Year	Program	Key objectives
1992	Aviation Industry Development Program	Preservation of Soviet industrial base
2003	State Industrial Development Program	Restoration of serial aircraft production
2013	Industrial Development Concept	Framework for sectoral programs
2021	Aviation Industry Development Program	Innovation and competitiveness

Source: compiled by the author based on information about national programs supporting Ukraine's aviation industry

As can be observed, support for the aviation industry in Ukraine is largely periodic in nature, whereas the Brazilian government has developed a comprehensive institutional system that integrates military organizations and their operational needs, research institutions, industrial policy instruments, and international cooperation in the development of new aircraft technologies.

The central mechanism for supporting the aviation industry in Brazil is Public Procurement for Innovation (PPI), with government defense procurement acting as a key driver of industrial development. During the period from the 1970s to the 2000s, prominent examples of such military programs include AM-X, AL-X (Super Tucano), F5-BR, and KC-390 [9, p. 2].

A critical factor behind the success of Embraer and the Brazilian aviation industry as a whole is the implementation of state-led programs aimed at developing and structuring the company's technological capabilities, including systems engineering, avionics, and flight testing.

Rather than relying on isolated programs with loosely defined actions, the Brazilian government establishes clear and effective mechanisms for industry support through regulatory and legislative frameworks. This includes institutions such as ANAC, established under Law No. 11.182 (2005) [10], as well as key legislative instruments such as the privatization law, which enabled Embraer to attract private capital and become a leading player in the regional aircraft market (Law No. 8.031/1990) [11].

In contrast, Ukrainian aviation programs implemented between 1992 and 2021 have been largely declarative in nature and, unfortunately, characterized by weak implementation. Meanwhile, the Brazilian government has adopted a series of laws and institutional reforms aimed at achieving tangible structural transformation, supported by strong and clearly defined implementation mechanisms.

Leading Aviation Companies in Ukraine and Brazil. One of the key companies in Ukraine's aerospace sector is JSC Antonov – the leading Ukrainian enterprise in the aircraft manufacturing industry, possessing all the divisions required for a full-cycle development of aviation products – from design to testing and serial production. Since its establishment in 1946, the company has developed more than 100 types and modifications of aircraft. Globally renowned aircraft include the An-124 ("Ruslan") and the An-225 ("Mriya") [12]. In April 2024, the company was reorganized into a joint-stock company, which strengthened its competitive position by enabling the attraction of external investment for further development. The sole shareholder (100% of shares) is the state-owned entity JSC "Ukrainian Defense Industry" [13].

The company's core business includes oversized and heavy cargo transportation services through its subsidiary Antonov Logistics SALIS, maintenance services, production of An-148/158/178 aircraft, and UAVs.

Antonov will face significant challenges competing with such aerospace giants as Boeing and Airbus which have divided between themselves the civil aviation markets, holding market shares of 56% and 40%, respectively, while Brazilian Embraer accounts for only 3% of the market, primarily through regional aircraft deliveries [14]. Since 2014, Antonov has lost a significant portion of its market due to the war with Russia and has delivered only a few serial aircraft to customers.

Embraer was selected as a benchmark for comparison with Antonov due to a number of structural and historical similarities between the two companies. Embraer was founded in 1969 by Ozires Silva and has since evolved into one of the leading global aircraft manufacturers. In terms of workforce, Embraer employs approximately 20,000 personnel, while Antonov employs around 10,000. These figures remain significantly lower compared to global aerospace leaders such as Airbus and Boeing, each of which employs roughly 170,000 people. Both companies maintain a large proportion of highly qualified personnel, estimated at 35–45% [15].

As of 2026, Embraer benefits from a more favorable geopolitical environment. However, excluding the impact of the ongoing war in Ukraine, the broader operating conditions of both companies can be considered relatively comparable. For example, with consistent and timely support from Ukraine's top state leadership since 1991, Antonov could have had strong prospects of entering the European market with competitive projects – particularly in the segment of military transport aircraft such as the An-70 and An-124. Furthermore, the company had opportunities to establish industrial cooperation in the production of passenger aircraft and missed the opportunity to initiate a joint venture for the development of medium-range aircraft based on projects such as the An-148 and An-158. In contrast to Antonov, the Canadian company Bombardier entered into a joint venture with Airbus in 2018 for the production of the CSeries aircraft, later rebranded as the A220. This agreement enabled Airbus to strengthen its position in the 100–150 seat market segment, while allowing Bombardier to mitigate bankruptcy risks associated with U.S. tariffs.

In response to this development, Boeing pursued plans to acquire control of the commercial aviation division of Embraer and to jointly produce aircraft from the E-Jets family. However, the deal ultimately collapsed due to Boeing's financial difficulties, driven by the Boeing 737 MAX crisis and the global impact of the COVID-19 pandemic.

Embraer places strong emphasis on STEM (Science, Technology, Engineering, and Mathematics) education, reflecting both national and corporate priorities in innovation and business development. Safety performance at Embraer is notable, with an incident rate of 1.1 per 200,000 work hours – lower than Boeing's 1.7 for the same number of hours. Another factor contributing to Embraer's success is government-backed contracts, which enabled the company to build expertise in military transport aviation that was later applied in the civilian sector.

The research "The Development and Importance of the Brazilian Aeronautical Industry" states that the Brazilian aeronautical sector faces significant challenges due to intense competition in the global market. To compete with industry leaders such as Boeing and Airbus, Brazilian companies must continuously innovate, improve efficiency, invest in education and sustainable initiatives, and pursue strategic collaborations (A.H. de Araujo, A.F.Viagi, 2024) [16]. However, one of the key factors in this context is the presence of favorable geopolitical and economic conditions, as well as sufficient leverage and influence in the global economy, which enable aviation companies to successfully market their products to international customers.

As of today, it is evident that despite Antonov's extensive expertise in military transport (An-26/32/132, An-70, An-178, An-124) and passenger aircraft (An-148/158), its cooperation with numerous international suppliers, and its post-2014 efforts to replace Russian components with foreign alternatives the company faces significant challenges in state procurement and global market access. While Brazil provides comprehensive support to Embraer through various governmental programs (e.g., the BNDES Innovation Financing Program), industrial policy frameworks (P. Veiga et S. Rios, 2019) [17], and government defense procurement, Ukraine currently faces significant financial and economic constraints.

To support domestic aerospace manufacturers, adopting an approach similar to that of the Brazilian government in supporting its aviation industry could be a priority for Ukraine. State support and strategic planning may include funding for research and development, the establishment of technology parks, support for certification processes, and the creation of an industrial cooperation system to strengthen domestic suppliers and component manufacturers.

The New Era of Technological Development. The world is entering a period of rapid technological revolution that is likely to significantly reshape how people live, work, and interact with one another. This revolution is characterized by a fusion of technologies that blurs the boundaries between the physical, digital, and biological spheres [18]. Fields such as AI, robotics, and unmanned vehicles are rapidly transforming the global technological landscape.

Drones have become one of the most effective means of defense in positional warfare and provide new strategic capabilities for national armed forces. They are inexpensive, fast, and highly effective under modern combat conditions [19].

Given the profound experience of the Ukrainian military and domestic UAV manufacturers in employing drones on the battlefield, Ukraine now has the potential to achieve global leadership in the UAV sector – designing, assembling, and maintaining unmanned aerial systems. By investing in UAV development and production, Ukraine not only strengthens its military capabilities but also positions itself in the global market for high value-added products, creates jobs, fosters new technologies, and develops economic clusters.

In the article published on the official portal of the National Security and Defense Council of Ukraine titled "Results of Ukraine's Defense Industry in 2025: FPV Drones", it is stated that in Ukraine over 160 companies of varying scales – from large factories to innovative enterprises specializing in unmanned systems – produce FPV drones [20]. At the onset of the full-scale invasion, there were only seven UAV manufacturers in the country.

UAV Development in the Context of the War in Ukraine. Contemporary warfare trends suggest that the traditional military transport aviation sector is becoming increasingly vulnerable and, in certain operational contexts, potentially unsustainable. The rapid advancement of fast and highly maneuverable UAVs, capable of targeting transport aircraft both at airbases and in flight, significantly undermines the survivability and operational viability of conventional airlift operations in large-scale conflicts.

Business Insider reported that, at the end of 2025, South African developers Luke and Mike Bell set a Guinness World Record for the speed of a quadcopter UAV, reaching 650 km/h [21]. Similar design approaches to those used in Australian high-speed UAVs are also being adopted by Ukrainian companies developing interceptor drones for countering Iranian-made Shahed-136. Currently, the speed of such Ukrainian interceptors does not exceed 450 km/h.

Interest in Ukrainian technologies has increased rapidly, particularly in the context of recent U.S. operations against Iran. In total, 11 countries – including the United States, European Union, and Gulf monarchies—have approached Ukraine for assistance regarding the interception of Shahe136. The value of these Ukrainian systems lies not only in the drones themselves, but in the integrated ecosystem they represent, including detection, control software, low-cost interceptors, and the combat experience of operators [22].

Conclusions. The cargo drone market was valued at USD 1.4 billion in 2024 and is expected to grow to USD 38.6 billion by 2034[23]. Companies that successfully certify their cargo platforms are likely to become leaders in this segment.

Ukraine's aviation industry should not aim to compete directly with Boeing and Airbus in international markets or to saturate the domestic market with domestically produced aircraft. Instead, it should focus on developing a unique niche centered on UAV design, assembly, after-sales support, software development, and customization to meet specific client requirements. This approach should be complemented by the creation of a favorable environment for joint ventures with international partners, as well as investments in workforce development and scientific laboratories. Particular emphasis should be placed on the development of UAVs across a wide range of applications, with a specialization aligned to the company's core expertise – transport aviation. Antonov already has some experience in UAV development, for example, the An-196 Liutyi, developed on the basis of the AN-BK-1 "Horlytsia," with a payload capacity of up to 75 kg and a maximum range of approximately 1,000 km [24]. Given the limited availability of public information regarding Antonov's recent UAV developments, there is no verified data on its latest projects in this field. However, considering the growing demand for long-range unmanned systems, it can be reasonably assumed that such developments are ongoing. Several companies around the world are already advancing the idea of UAV cargo transport, such as Dronamics (Bulgaria) with its project Black Swan, payload ~350 kg for a range up to 2500 km [25], Natilus (USA) that focus on the cost reduction in air freight. The twin-engine turboprop will have a maximum takeoff weight of 8,618 kg, a maximum range of 1,667 km and is expected to carry a load of LD3 containers to a maximum weight of 3,855 kg [26]. CASC (China Aerospace Science and Technology Corporation) with CH-YH1000 cargo UAV and payload ~1200 kg and an operational range of 1,500 kilometers [23].

Ukraine should reassess its long-term strategic positioning within the global aviation market. Make an adjustment of its "Resolution No. 951 – Scientific and Technical Program for the Development of the Aviation Industry for 2021–2030" taking into consideration rapid grow technology development and shifting in mindset – from a predominantly competitive approach toward a more cooperative, innovation-driven, and research-oriented model of development. In this context, identifying and cultivating a distinct niche such as cargo drones, aligned with emerging technological and geopolitical trends, should become a central strategic priority.

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