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CHALLENGES OF SUSTAINABLE DEVELOPMENT AND SAFETY MANAGEMENT OF WORLD CIVIL AVIATION IN THE CONDITIONS OF GLOBALIZATION

Dmytro Bugayko, Ganna Gurina, Marina Korzh, Kateryna Sydorenko "Challenges of sustainable development and safety of world civil aviation in the conditions of globalization". *The UN's global strategic document is the 2030 Agenda for Sustainable Development. It is an action plan aimed at ensuring global sustainable development in economic, social and environmental directions, which ensures that no UN member country is left behind. The 17 Sustainable Development Goals in the 2030 Agenda can be used as guidelines for the coordinated development of UN member states. Every year, the number of countries that also*

connect aviation to a wider range of UN Sustainable Development Goals, such as 4, 8, 9, 11, 13, 14, 16 and 17, is increasing. At the same time, the achievement of these goals requires working out the theoretical foundations of strategic management of global civil aviation safety. The issue of aviation safety is one of the top priority challenges from the first day of flights. Years passed, technology, avionics, engines, navigation aids changed and developed, but the problem did not lose its relevance. ICAO's purpose: to ensure the safe and orderly development of all aspects of international civil aviation. ICAO develops Standards and Recommended Practices. They are set out in 19 Annexes to the Convention on International Civil Aviation. ICAO's new strategies are the basis for further sustainable development of global civil aviation.

Keywords: sustainable development, world civil aviation, globalization, safety.

Дмитро Бугайко, Ганна Гуріна, Марина Корж, Катерина Сидоренко «Ризик менеджмент повоєнного відновлення та сталого розвитку авіаційного транспорту України». Стратегічним документом глобального рівня ООН є Порядок денний сталого розвитку до 2030 року. Це план дій, орієнтований на забезпечення світового сталого розвитку в економічному, соціальному та екологічному напрямках, який гарантує, що жодна країна-член ООН не залишається позаду. 17 Цілей сталого розвитку в порядку денному на 2030 рік можуть використовуватися як орієнтири для узгодженого розвитку країн-членів ООН. Щорічно зростає кількість держав, які також підключають авіацію до більшого кола Цілей сталого розвитку ООН, таких як 4, 8, 9, 11, 13, 14, 16 та 17. При цьому досягнення зазначених цілей потребує відпрацювання теоретичних засад стратегічного управління безпекою світової цивільної авіації. Проблема безпеки авіації є одним із найпріоритетніших викликів з першого дня виконання польотів. Плинули роки, змінювалась та розвивалась техніка, авіоніка, двигуни, засоби навігації, але проблема не втрачала власної актуальності. Мета ІКАО: забезпечення безпечного й упорядкованого розвитку всіх аспектів міжнародної цивільної авіації. ІКАО розробляє Стандарти і Рекомендовану практику. Вони викладені в 19 Додатках до Конвенції про міжнародну цивільну авіацію. Нові стратегії ІКАО є підґрунтям подальшого сталого розвитку глобальної цивільної авіації.

Ключові слова: сталий розвиток, світова цивільна авіація, глобалізація, безпека.

Дмитрий Бугайко, Анна Гурина, Марина Корж, Екатерина Сидоренко «Риск менеджмента послевоенного восстановления и устойчивого развития авиационного транспорта Украины». Стратегическим документом глобального уровня ООН является Повестка дня устойчивого развития до 2030 года. Это план действий, ориентированный на обеспечение мирового устойчивого развития в экономическом, социальном и экологическом направлениях, гарантирующий, что ни одна страна-член ООН не остается позади. 17 Целей устойчивого развития в повестке дня на 2030 год могут использоваться в качестве ориентиров для согласованного развития стран-членов ООН. Ежегодно растет количество государств, также подключающих авиацию к большому кругу Целей устойчивого развития ООН, таких как 4, 8, 9, 11, 13, 14, 16 и 17. При этом достижение указанных целей требует отработки теоретических основ стратегического управления безопасностью мировой гражданской авиации. Проблема безопасности авиации является одним из самых приоритетных вызовов с первого дня выполнения полетов. Проходили годы, менялась и развивалась техника, авионика, двигатели, средства навигации, но проблема не теряла собственной актуальности. Цель ИКАО: обеспечение безопасного и упорядоченного развития всех аспектов международной гражданской авиации. ИКАО разрабатывает Стандарты и Рекомендуемую практику. Они изложены в 19 Приложениях Конвенции о международной гражданской авиации. Новые стратегии ИКАО являются основой для дальнейшего устойчивого развития глобальной гражданской авиации.

Ключевые слова: устойчивое развитие, мировая гражданская авиация, глобализация, безопасность.

Introduction. The UN's global strategic document is the 2030 Agenda for Sustainable Development. It is an action plan aimed at ensuring global sustainable development in economic, social and environmental directions, which ensures that no UN member country is left behind. The 17 Sustainable Development Goals in the 2030 Agenda can be used as guidelines for the coordinated development of UN member states. air transport is an open system, which, on the one hand, is affected by a wide range of technical, natural, human and economic threats, and on the other hand, it itself is a generator of significant threats to the external environment. It was determined that the achievement of the following Global Sustainable Development Goals (SDGs) directly or indirectly depends on the results of aviation activities: 4. Quality education; 8.

Decent work and economic growth; 9. Industry, innovation and infrastructure; 11. Sustainable cities and societies; 13. Climate changes.

The defined list of Sustainable Development Goals, in the solution of which aviation transport participates, is not exhaustive. Every year, the number of countries that also connect aviation to a wider range of UN Sustainable Development Goals, such as 4, 8, 9, 11, 13, 14, 16 and 17, is growing. In the future, this list will only expand. At the same time, the achievement of these goals requires working out the theoretical foundations of strategic management of global civil aviation safety. Organizational and economic mechanism for the interaction of sustainable development goals with goals of aviation strategic management is shown in the Figure 1.

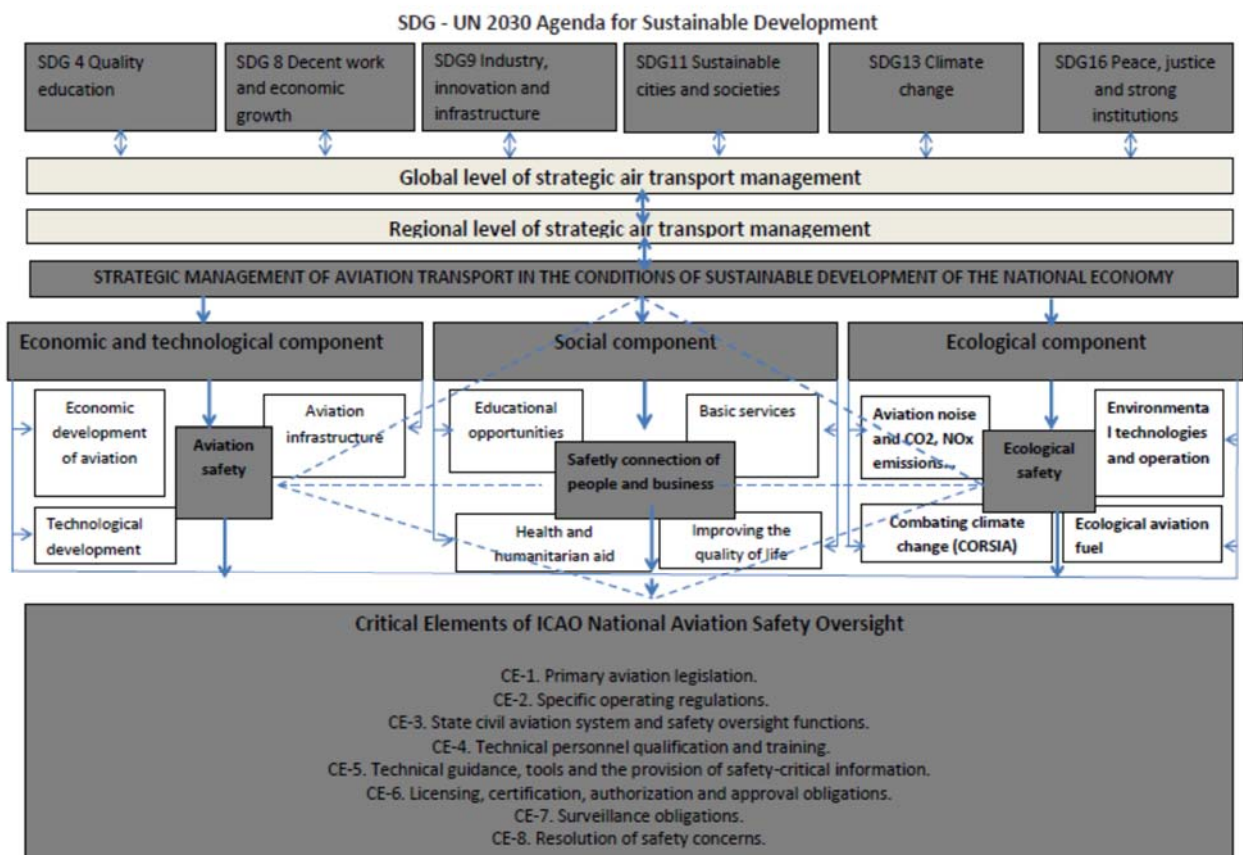


Figure 1. Organizational and economic mechanism for the interaction of sustainable development goals with goals of aviation strategic management

Source: Bugayko D.O., Kharazishvili Yu.M. Theoretical bases of aviation branch strategic safety management in the context of maintenance of sustainable development of national economy. Bulletin of Economic Science of Ukraine. 2020. № 1 (38). Pp. 166-175. Institute of Industrial Economics of the National Academy of Sciences of Ukraine, Academy of Economic Sciences of Ukraine [1].

The main tasks of the aviation industry are the development of transportation at the global, regional and national levels in order to ensure economic, social and environmental priorities, as well as maintaining an acceptable level of safety of world civil aviation [1].

The purpose of the article is to consider the main challenges of sustainable development and safety of world civil aviation in the conditions of globalization.

Presentation of the main results. If you delve into history, you can tell that the first post-war decades were marked by a very high level of accidents. Almost every thousandth flight had serious safety problems. At the same time, in the list of the main causes of events, the first place was occupied by the failure of aviation equipment. At this stage, the most effective tool for combating disasters has become reverse methods - investigation of aviation events and serious incidents. It was they who made an invaluable contribution to the modernization of aviation equipment. The joint work of specialists from many countries of the world has led to the fact that gradually technical factors, although they take place in the development of emergency situations in aviation, have mostly lost their critical nature.

The achievements of designers, scientists and experts managed to reduce the probability of a disaster to one in 100 thousand flights until the 70s. The period from the 70s to the 90s of the 20th century was marked by the active development of ICAO Standards and Recommended Practice within the 18 annexes to the Chicago Convention [2]. Among the main methods that are widely used at this stage, it is possible to identify preventive ones. Preventive method – on the basis of analysis of the organization's structure and activities,

identification of vulnerable places, measures are developed to eliminate them and reduce the level of risk. At the same time, the person himself became the critical link of the "people - technology - environment" system. Research in the field of the human factor received an undisputed priority.

Further development of the aviation safety toolkit included predictive method approaches. The predictive method captures system characteristics that appear in real time under normal conditions. The role of the human factor in the process of development of crisis situations has been changed and understood. The concept of the organizational factor was proposed in the development of human factor research. The organizational factor means the following maxim - if a person makes a catastrophic mistake in a given situation, not only the person is to blame, but also the system that allowed the person to make such a mistake and did not provide additional means of protection.

The integrated application of the three above-mentioned methods made it possible to increase the global level of safety to 1 disaster per 10 million flights. These figures are a confirmation of the undeniable progress of the global aviation security system. But, unfortunately, numbers do not always fully reveal the real picture. According to the estimates of the world's leading civil aviation organizations, the number of flights doubles every 15-20 years. Therefore, reducing the probability of a disaster, unfortunately, does not cancel the probability of human losses [3].

Clearly aware of this trend, ICAO emphasized the need to change the global approach to the problem of aviation security. A new Annex 19 to the Convention on the International Civil Aviation Organization "" was proposed. It is proposed to combine the

Standards and Recommended Practices from six different Appendices with the aim of:

- strengthening the role of the state at the highest level (coordination between all resources and all interested parties);
- ensuring the availability of a legal basis in one document;
- development of agreed standards that can be applied to different resources;
- improving identification and development of future needs;
- organization of a specialized group of ICAO experts in the field of aviation safety for cooperation with the European Union, the European Safety Agency and other regional aviation organizations;
- ensuring a global approach through the implementation of new ICAO strategies for civil aviation safety [4].

A new definition of aviation safety was proposed: "Safety is a state of the air transport system in which the risk is reduced to an acceptable level as a result of the continuous process of threat identification and risk management and is maintained at this level or further reduced" [3].

According to the provisions of the new ICAO aviation safety strategies, the aviation safety management system (SMS) is a structured approach to management that includes: the necessary organizational structures, areas of responsibility, policies and procedures. According to ICAO's systemic approach to aviation safety issues, any product/service provided by aviation organizations must be safe. In order to ensure this goal, ICAO adopted new documents. The widespread use of the latest proactive methods ensured the detection of new threats and the correction of change management to threats that were identified in the past.

The main strategic document for the implementation of ICAO's systemic approach in the field of aviation safety is the Global Aviation Safety Plan (GASP). GASP is a high-level policy document on strategy and planning. The GASP defines a strategy for continuous improvement, which includes the

goals of the states, which must be achieved by:

- implementation of effective control systems for ensuring flight safety,
- implementation of state safety programs (SSP),
- development of improved flight safety control systems, including anticipatory risk management [5].

According to the new ICAO strategies, each state requires the implementation of an aviation safety management system by the following aviation organizations: approved training organizations; aircraft or helicopter operators; approved maintenance organizations; organizations responsible for type design or manufacturing of aircraft; air traffic service providers; operators of certified airfields. In modern conditions, the development of safety culture is of fundamental importance. A safety culture is a set of enduring values and attitudes related to safety that are shared by all employees at all levels of the organization. This is the level of awareness of each employee of the organization regarding possible risks and threats caused by their activities. A safety culture establishes a framework for acceptable behavior in the workplace by imposing norms and restrictions. It provides a basis for decision-making by managers and staff.

Civil aviation is an open system that is affected by a wide range of technical, natural, human and economic threats. Each threat leads to the potential development of a number of risks. At the same time, according to the estimates of the world's leading civil aviation organizations, the number of flights doubles every 15-20 years. Under such conditions, the application of ICAO's new strategies for civil aviation safety is seen as the most effective tool for ensuring an acceptable level of safety in world civil aviation [6].

The development of world civil aviation is accompanied by continuous technological progress and requires constant improvement in the field of control and reduction of dangerous factors in its activity. However,

despite all efforts to prevent failures and errors, they will nevertheless occur, and 100% security cannot be achieved. No type of human activity and no artificial system can be guaranteed to be absolutely safe, that is, free from risks. Safety is a relative concept, which implies that in a "safe" system, the presence of risk factors is considered an acceptable situation.

An effective tool for reducing the level of risks is global cooperation in international civil aviation. One of the main goals of the activities of the leading world and regional organizations in the field of civil aviation is the creation of a single global system for ensuring aviation safety.

The cooperation of ICAO member states is aimed at the global support of ICAO Standards and Recommended Practices (ISAO SARPS), which are constantly updated within the framework of 19 annexes to the 1944 Chicago Convention. ICAO's strategic goals are to ensure flight safety, aviation and environmental safety. An important step in the development of world civil aviation security was the decision to put into effect in November 2013 the 19th Annex to the Chicago Convention, dedicated to the management of aviation security. The new application incorporated the concept of the State Flight Safety Program and 8 critical elements of the flight safety oversight system. The application covers activities in the field of general aviation and commercial aviation. Annex 19 reinforces the role of the state in maintaining safety at the national level, emphasizing the concept of joint work to ensure safety in all areas, in coordination with air navigation service providers.

The new application is being developed in two stages. The first stage consists in the generalization of already existing safety management provisions contained in 6 Annexes into one new Annex. At the same time, the main provisions related to flight safety management are transferred from the following Annexes:

Appendix 1 – Issuance of certificates to aviation personnel;

Appendix 6 – Operation of aircraft, Part I – International commercial air transport – Airplanes, Part II – International general aviation – Airplanes and Part III – International flights – Helicopters;

Appendix 8 – Airworthiness of aircraft;

Appendix 11 – Air traffic service;

Appendix 13 – Investigation of aviation events and incidents;

Appendix 14 – Aerodromes, Volume I – Design and operation of aerodromes.

The principle difference of the provisions of Annex 19 was the expansion of the conceptual framework of the flight safety management system to the level of organizations responsible for the design of the type or manufacture of aircraft, raising the level of Standards in the field of safety, expanding the powers of the state control system over ensuring flight safety to the level of all service and product suppliers.

Particular attention is paid to the collection, analysis and exchange of flight safety data and the legal principles of information protection in flight safety data collection and processing systems [4]. Based on these approaches, the fourth edition of Document 9859 "Safety Management Manual" was published, which is based on the conceptual framework of the State Safety Program and the Aviation Safety Management System [3]. The second stage of the development of Program 19 will be devoted to the definition of expanded Standards and Recommended Practices in the field of a unified aviation safety management system.

Cooperation within corporate associations (for example, the International Air Transport Association (IATA), the Air Transport Association of America (ATA) and the Civil Aviation Service Organization (CANSO) [7].

Cooperation within national and international aviation associations (for example, National Business Aviation Association (NBAA), European Business Aviation Association (EBAA) and others).

Cooperation within the framework of international federations of national associations (for example, the International Federation of Airline Pilot Associations (IFALPA) and the International Federation of Air Traffic Controller Associations (IFATCA).

Activities of international aviation safety bodies (for example, the World Flight Safety Foundation (FSF) and the International Society of Aviation Safety Investigators (ISASI));

Collaboration within industry / government groups (eg, the Commercial Aviation Safety Team (CAST) and the Pan American Commercial Aviation Safety Team (PAST));

Conducting large forums on aviation safety with the participation of manufacturers of aviation equipment and equipment [8].

A positive aspect of such cooperation is the development of a comprehensive approach only to the problems of aviation safety, taking into account not purely technical and technological issues, but also the determination of commercial and economic market risks for various air transport entities. This is extremely important, given that in the context of globalization, there has been a tendency to decrease state support for aviation enterprises.

Under such conditions, world civil aviation is focused on achieving three main goals - safety, efficiency and economic feasibility. Problems in achieving any of them endanger the normal functioning of the industry [9]. The issues of efficiency and economic feasibility are among the priorities in solving the tasks of maintaining the acceptable level of safety & security [10].

In fact, the philosophy of aviation safety changes with the understanding of its technical and technological component and expands to determine the degree of severity of risks to property, life and health of people, the environment, financial security and legal responsibility of the air transport enterprise, its image and public trust in it. At the same time, harmonization, integrity and operational system of interchangeability of

the complex safety sector is achieved; expands worldwide information related to aviation security; detection and elimination of global systemic sources of danger at an early stage. Effective management of aviation security policy requires a systematic approach to development, procedures and recommended practices [11].

The issue of ensuring flight safety always remains the main priority of the development of the industry. By combining membership in the International Civil Aviation Organization and obligations within the framework of the Convention on International Civil Aviation (Chicago Convention of 1944), aviation states make efforts to improve the level of aviation safety. Coordination of their activities, identification of common threats and approaches to risk management, common terminology and mechanisms for notification and information exchange play an essential role in this.

One of the effective tools for implementing a systemic approach to aviation safety issues is the Global Aviation Safety Plan (GASP) (Doc 10004) – a high-level directive document on strategy, planning and implementation, developed simultaneously with the Global Air Navigation Plan (Doc 9750) [5, 11].

The Global Aviation Safety Plan and the Global Air Navigation Plan coordinate international, regional and national initiatives for the systemic development of international civil aviation.

A positive aspect of such cooperation is the development of a comprehensive approach only to the problems of aviation safety, taking into account not purely technical and technological issues, but also the determination of commercial and economic market risks for various air transport entities. This is extremely important, given that in the context of globalization, there has been a tendency to decrease state support for aviation enterprises.

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In fact, the philosophy of aviation safety changes with the understanding of its technical and technological component and expands to determine the degree of severity of risks to property, life and health of people, the environment, financial security and legal responsibility of the air transport enterprise, its image and public trust in it. At the same time, harmonization, integrity and operational system of interchangeability of the complex security sector is achieved; expands worldwide information related to aviation security; detection and elimination of global systemic sources of danger at an early stage. Effective management of aviation safety policy requires a systematic approach to development, procedures and recommended practices [12].

The issue of ensuring aviation safety always remains the main priority of the development of the industry. By combining membership in the International Civil Aviation Organization and obligations within the framework of the Convention on International Civil Aviation (Chicago Convention of 1944), aviation states make efforts to improve the level of aviation safety. Coordination of their activities, identification of common threats and approaches to risk management, common terminology and mechanisms for notification and information exchange play an essential role in this.

One of the effective tools for implementing a systemic approach to aviation safety issues is the Global Aviation Safety Plan (GASP) (Doc 10004) – a high-level directive document on strategy, planning and implementation, developed simultaneously with the Global Air Navigation Plan (Doc 9750) [5, 11].

The Global Aviation Safety Plan and the Global Air Navigation Plan coordinate international, regional and national initiatives

for the systemic development of international civil aviation.

The Global Aviation Safety Plan is aimed at:

- implementation of effective control systems for ensuring flight safety,
- implementation of state programs on flight safety,
- development of improved flight safety control systems, including anticipatory risk management [5].

The main objective of the Global Aviation Safety Plan is the coordinated development of regional and national aviation safety plans. It is aimed at providing assistance to States and regions in their implementation of aviation safety policy, planning and implementation. Constant improvement of the level of flight safety is achieved with the help of:

- development of global strategies contained in the Global Aviation Safety Plan and the Global Air Navigation Plan;
- development and updating of Standards and Recommended Practices (SARPS) and Air Navigation Service Rules (PANS);
- monitoring trends and indicators of aviation safety;
- implementation of targeted aviation safety programs to eliminate deficiencies in this area and infrastructural deficiencies;
- effective response to disruptions in the aviation system caused by natural disasters, conflicts or other reasons [5, 13].

States should implement the Global Plan for ensuring flight safety, relying on the basic systems of national control over ensuring flight safety. As part of the Global Aviation Safety Plan, a Global Aviation Safety Roadmap has been proposed to provide an action plan for the global aviation community. Coordination of actions of different aviation countries will allow coordinating actions and correcting inconsistencies and avoid duplication of efforts.

Conclusions. ICAO promotes cooperation between States and other

stakeholders to ensure a coherent, transparent and proactive approach to aviation safety. Stakeholders include ICAO, States signatories to the Convention on International Civil Aviation (1944 Chicago Convention), international and regional aviation organizations, Regional Aviation Safety Groups (RASGs), Regional Safety Oversight Organizations (RSOOs), regional aviation event and incident investigation organizations, industry representatives, air navigation service providers, operators, airfields, manufacturers of aviation

equipment and equipment, organizations for maintenance of aviation equipment and equipment. A deep integration of actions and a systematic approach to the implementation of the aviation safety strategy is the key to the development of the global civil aviation industry. The step-by-step implementation of the provisions of the above-mentioned document will allow achieving a unified approach to the implementation of aviation safety requirements in all 193 ICAO member countries.

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