EXPERT'S REPORT

INTERNATIONAL CIVIL AVIATION ORGANIZATION

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MODEL UNITED NATIONS

ENSURING GLOBAL FLIGHT SAFETY IN THE FACE OF THE DESTRUCTION OF TRADITIONAL SUPPLY CHAINS

CONTENTS

INTRODUCTION

Over the past half century, most of the production process around the world has been organized into global supply chains of international supplies. Now almost all countries of the world are more or less included in this system. Global supply chains have become a generally accepted way of organizing the process of investment, production and trade in the context of economic globalization. Raw materials and intermediate goods are shipped around the world several times and then assembled elsewhere. The final products are re-exported to consumers in both developed and emerging markets. Global value chains make it possible to exchange their components instead of trading goods, and thus countries use their competitive advantages.

Until recently, little attention has been paid to the resilience of supply chains to crisis events. However, as global supply chains have become more complex, their vulnerability has increased. The dynamics of the stability of supply chains and industrial relations within the global economy has been seriously undermined by several temporary and structural factors of a global nature.

Even before the Covid-19 pandemic, the first signs of a break in global value chains began to appear, which cast doubt on the prospects for the globalization of the world economy. In terms of changing supply chain dynamics, shifts related to past crises, such as the outbreak of severe acute respiratory syndrome in 2003, which swept the entire Asian region; the Fukushima nuclear disaster in 2011 (stopped factories producing electronic components for cars); floods in Thailand in 2011 (factories producing about a quarter of the world's hard drives were flooded, resulting in a difficult situation for manufacturers of personal computers); in 2017, Hurricane Harvey (several major U.S. refineries and

petrochemical plants were destroyed, which led to a shortage of key plastics and resins for a number of industries industry), the UK's exit from the European Union. The consequences were not as harmful as those of the events of the present day.

Since 2019, when the coronavirus began to paralyze international trade and stopped supply chains, the availability of entire categories of goods has become a serious problem: delivery rates have decreased, and price fluctuations have become extremely large[1]. However, unlike the previous problems faced by the global economy, the consequences of the coronavirus pandemic simultaneously covered almost all links of the global supply chain. Supply, transportation and production faced numerous problems that led to a reduction in production capacity. This was also facilitated by such phenomena as the closure of borders, the blocking of the supply market, the instability of the functioning of transport systems, and the shortage of labor.

Today, supply chains are also strongly influenced by the geopolitical context. The greatest risk facing global supply chains has shifted from the pandemic to the Ukrainian crisis, and the combination of the US-China trade war with unprecedented international sanctions and rising fuel costs is putting additional pressure on the regulation of the global supply chain.

The global processes discussed above affect both supply and demand, and also affect the maximum number of participants in the global community and areas of production, therefore, potential threats are more serious than those that occurred earlier. The immediate consequences of global events remain very uncertain for

[1]DOT's Tracking of Aviation Imports and Potential Impacts of Disruptions URL: https://www.oig.dot.gov/sites/default/files/DOT%20Aviation%20Supply%20Chain%20Final%20Report%5E12.19.2022.pdf

the further resolution of the global supply chain crisis. Nevertheless, for many countries it was a serious reason to rethink the previous "pre-crisis" model – discussions are now underway about the need to relocalize part of production, diversify suppliers, and reduce the transport factor.

To date, aviation has entered a safety reliability era characterized by an ultra-safe system thanks to the multiple-fold increase in safety regulations and the massive introduction of technologies – globally accidents have become infrequent to the extent of becoming exceptional events. However, in the context of the disruption of traditional supply chains, it is worth noting that the aviation industry is experiencing difficulties, and ignoring can lead to disastrous consequences for humanity.

Let's delve into the issues of regulating global flight safety in the current conditions of instability of global supply chains and find out what measures need to be implemented.

CHAPTER 1. AVIATION SAFETY MANAGEMENT SYSTEM: UN POLICIES AND REGULATIONS ON FLIGHT SAFETY

In the context of aviation, safety is considered as "a condition in which the possibility of harm to people or damage to property is reduced to an acceptable level and maintained at or below it through a continuous process of hazard risk occurrence, identification and management of safety risks". Although the elimination of accidents and/or serious incidents remains the ultimate goal, it must be recognized that the aviation system cannot be completely free of hazards. It is impossible to guarantee that man-made systems will be absolutely free from operational errors and their consequences. Thus, safety is a dynamic characteristic of the aviation system, in which security risks must be constantly reduced.

The history of aviation safety system development can be divided into three periods (Table 1):

- **From the 1900s to the 1960s.** Aviation appeared as a form of mass transportation, in which safety deficiencies were initially associated with technical factors and failures. Therefore, the focus of safety efforts has been on investigation and improvement of technical factors. By the 1950s, technological improvements led to a gradual decline in the frequency of accidents, and safety processes were expanded: the first compliance and supervision regulations were created.

- **From the 1970s to the mid-1990s.** During this period, the frequency of aviation accidents decreased significantly due to technological advances and improvements in safety regulations. The focus has shifted to safety efforts, which have been expanded to include human factor issues. Despite the investment of resources in eliminating the mistakes of both human factor and technology, human activity was the main factor generating accidents. In the early 1990s, it was recognized for the first time that people operate in a complex environment that includes many additional external factors that can potentially affect their behavior.
- **From the mid-1990s to the present days.** In this era, security began to be considered from a systemic point of view, which had to cover organizational factors in addition to human and technical factors. As a result, the concept of "organizational randomness" appeared. It was introduced taking into account the impact of organizational culture and policy on the effectiveness of security and risk control. In addition, traditional data collection and analysis efforts, which were limited to the use of data collected during the investigation of accidents that have already occurred, have been complemented by a new approach to safety. The new approach was based on data collection and analysis using monitoring, assessment and prediction of safety risks and detection of emerging security problems.

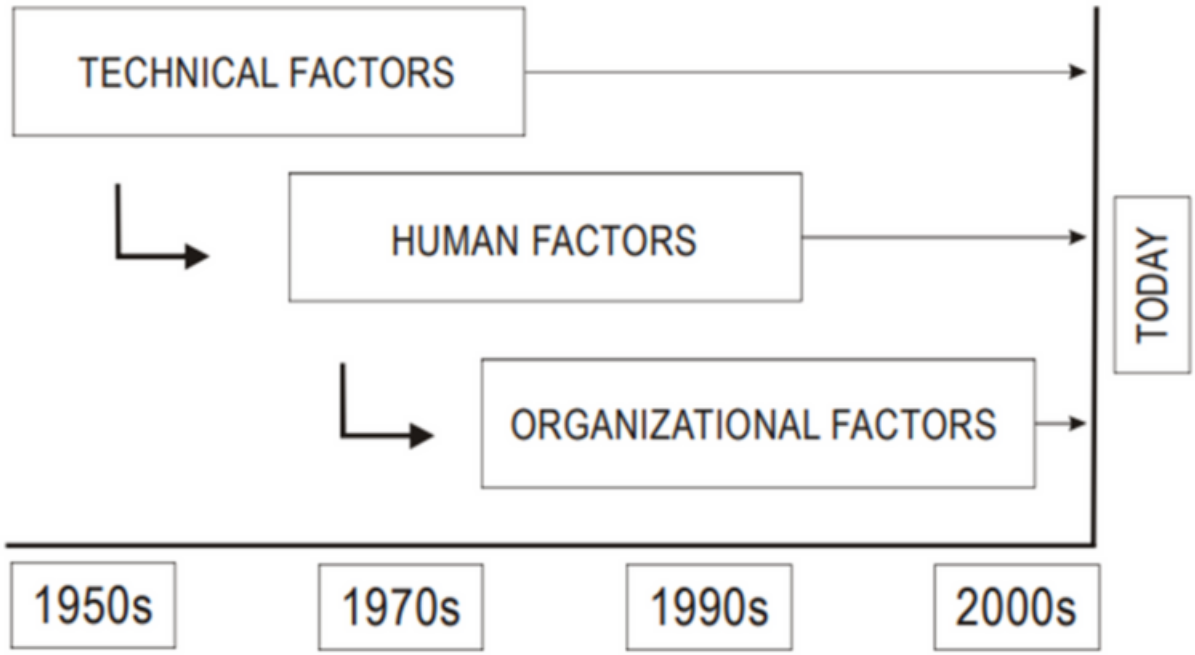

Table 1. Safety Aviation Development Eras[2]

The security management process requires a specific mechanism such as the flight (aviation) Safety Management System (SMS). It is an instrument that provides a systematic and proactive approach to flight safety and security issues, allowing organizations to:

- predict the occurrence of problems in the field of flight safety and eliminate them before they lead to an incident;
- effectively use the lessons learned as a result of accidents and incidents, to increase the level of safety and efficiency of flights;
- reduce costs by using proactive risk management methods.

[2]Safety Management Manual (SMM) // International Civil Aviation Organization // Chapter 5 URL: https://www.icao.int/SAM/Documents/2017-SSP-GUY/Doc%209859%20SMM%20Third%20edition%20en.pdf

Summarizing the above, SMS builds upon the dogma of System Safety and expands the field of perspective to include human performance as key safety considerations during system design and operation. So, SMS may be defined as "a businesslike approach to safety. A systematic, explicit and comprehensive process for managing safety risks. It gives an access to goal setting, planning, and measuring performance"[3].

Having dealt with the definition of flight safety and SMS, it is necessary to consider what components SMS consists of. There are 4 basic features of SMS (Table 2.):

- Top management commitment to safety. This is an important attribute as the attitudes and actions of management can significantly influence the culture of the entire workforce.
- Proactive (preventive) hazard identification process and reporting structure which is characterized by the continuing prompt identification as well as reporting hazards.
- Timely actions taken to manage risks to a level that is as low as reasonable practice. A system must be in place to control logical approaches to respond to known risks and mitigate the risks to a level for continued safe operation.
- Robust change management program to evaluate changes and safety actions. The continuing appraisal of the impacts of risk management actions is necessary to ensure a closed loop process for determining if further remedial activities are required.

[3]Yeun R., Bates P., Murray P. Constructed from International Civil Aviation // World Review of Intermodal Transportation ResearchOrganization, 2014, P. 170 URL: https://www.researchgate.net/publication/272407153_Aviation_safety_management_systems

ICAO safety management system model			
Four major elements			
Safety policy and objectives	Safety risk management	Safety assurance	Safety promotion
Twelve sub elements			
Management commitment and responsibility	Hazard identification	Safety performance monitoring and measurement	Training and education
Safety accountabilities	Safety risk assessment and mitigation	The management of change	Safety communication
Appointment of key personnel		Continuous improvement of the SMS	
Coordination of the emergency response plan			
SMS documentation			

Table 2. ICAO SMS Model[4]

Thus, SMS has become a key part of improving flight safety in such a dynamic and critical industry as aviation.

Over the past few years, aircraft maintenance has benefited from increased attention to how the human factor can contribute to safety and operational efficiency. In a narrow sense, the human factor is often considered synonymous with crew resource management or maintenance resource management. All levels of management and all employees are responsible for ensuring this highest level of security, starting with the Chief Executive Officer (CEO) / Managing Director. The responsible manager, selected by the service provider, is the only person who bears full responsibility for the SMS. The powers and responsibilities of the responsible manager include: provision and allocation of human, technical, financial or other resources necessary for the effective and efficient operation of SMS; final authority for operations in accordance with the certificate/appro-

[4]Aviation safety management systems // World Review of Intermodal Transportation Research P. 179 URL: https://www.researchgate.net/publication/272407153_Aviation_safety_management_systems

val of the organization; establishment and promotion of a security policy; establishing the goals and objectives of the organization's safety and security, etc. The service provider must additionally appoint a security manager who will be responsible for maintaining and monitoring an effective SMS. The security manager is usually assisted by additional junior staff[5].

The regulatory framework for ensuring flight safety consists of documents developed by the International Civil Aviation Organization. There are three groups in the structure of the ICAO document system[6]:

- Regulatory and recommendation documents;
- Instructional and methodological documents;
- Technical documents.

The main document – the Chicago Convention (1944) and its Annexes containing International Standards and Recommended Practices (SARPS), as well as Rules for Air Navigation Services (PANS) and Additional Regional Rules (SUPPS):

- Aviation Standards For Peacekeeping And Humanitarian Air Transport Operations[7];
- Safety Management Manual[8];

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[5]Convention on International Civil Aviation - Doc 7300. URL: https://www.icao.int/publications/pages/doc7300.aspx
[6]State of Global Aviation Safety URL: https://www.icao.int/safety/Documents/ICAO_SR_2019_final_web.pdf
[7]Aviation Standards For Peacekeeping And Humanitarian Air Transport Operations // United Nations official website URL: https://www.un.org/Depts/ptd/sites/www.un.org.Depts.ptd/files/files/attachment/bulletin/2014/February%202014/AVSTADS%28Ver3Sep2012%29.pdf
[8]Safety Management Manual (SMM) // ICAO URL: https://www.icao.int/SAM/Documents/2017-SSP-GUY/Doc%209859%20SMM%20Third%20edition%20en.pdf

- Global Aviation Safety Plan[9].

To sum up, in this chapter a general perception of the essence of flight safety was formed and personalities and documents in charge for the flight safety were examined.

[9]Global Aviation Safety Plan // ICAO URL: https://www.icao.int/safety/safetymanagement/documents/global%20aviation%20safety%20plan%20highlights_en.pdf

CHAPTER 2. THE RELATION OF FLIGHT SAFETY TO SUPPLY CHAINS

Civil aviation is a vital sector of the global economy that makes a significant contribution to the development of the global transport network, national security and global mobility. The industry is also a complex network of suppliers, manufacturers, distributors and service providers that operate in different countries on different continents. Nowadays, the aviation supply chain faces unprecedented challenges due to the COVID-19 pandemic, geopolitical tensions and natural disasters.

At the moment, multinational corporations that manufacture and sell airplanes, telecommunication equipment worldwide are facing huge obstacles, including the ongoing shortage of labor and raw materials, as well as the lack of alternative suppliers of the necessary parts for the creation and repair of aircrafts[10].

According to a Deloitte report, the global aviation and aerospace industry experienced a decline of 2.2%[11]. The decline was primarily due to a decrease in demand for air transportation and rising of fuel prices. Disrupted global supply chains caused delays and shortages of critical components. A survey conducted by Gartner demonstrated that 47% of aerospace companies have reported supply chain failures over the past 12 months, the average cost of each failure was $184 was milli-

[10]Air travel to be disrupted by 'very frustrating' supply chain issues, IATA's Willie Walsh says URL: https://www.cnbc.com/2023/06/05/air-travel-to-be-disrupted-by-very-frustrating-supply-chain-issues-iatas-willie-walsh-says.html

[11]2023 aerospace and defense industry outlook URL: https://www2.deloitte.com/us/en/pages/manufacturing/articles/aerospace-and-defense-industry-outlook.html

on[12]. The most common causes of supply chain failures were demand volatility, transportation disruptions, and supplier bankruptcy.

Effective and efficient aerospace supply chains are critical to aviation organizations functioning successfully. These supply chains are highly intricate, comprising multiple tiers of suppliers, including original equipment manufacturers, prime contractors and integrators, repair and overhaul providers, small parts suppliers and maintenance support teams[13]. The disruption of global transportation and logistics networks has emerged as one of the primary factors contributing to aerospace supply chain issues. The delays in the delivery of raw materials and components to manufacturing sites have made it difficult for airplane part manufacturers to maintain production schedules, leading to reduced output and increased costs.

Airlines are being affected by engine shortages and delays in maintenance. Many airlines are investing in newer planes and more fuel-efficient engines. Aircraft engine shortages will likely result in reduced cargo capacity, as passenger planes also carry significant amounts of freight in their belly holds.

Just-in-time manufacturing and distribution systems in industries that rely on precise coordination and rapid delivery, such as pharmaceuticals, healthcare, automotive and electronics, may face significant disruptions. A shortage of aircraft capacity can disrupt the timely delivery of critical components and raw materials, leading to production delays and supply chain bottlenecks. Companies operating on tight schedules

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[12]Clouds clearing up for the aerospace sector URL: https://www.thehansindia.com/hans/opinion/news-analysis/clouds-clearing-up-for-aerospace-sector-822877

[13]A study on aviation supply chain network controllability and control effect based on the topological structure URL: https://www.aimspress.com/article/doi/10.3934/mbe.2022293?viewType=HTML

and with minimal inventory buffers may struggle to meet customer demand, potentially creating ripple effects throughout the supply chain.

Supply chain problems in the aerospace sector are hobbling aircraft output and causing carriers to resort to desperate measures to keep their planes in the air[14]. Aircraft production is sputtering. Amid rising orders for its jets, Boeing tripped up again, having to pause delivery of 737 Max aircraft as a result of a faulty supplied part that attaches the tail to the rear end of the fuselage. Already, owing to problems with parts, the plane-maker earlier had to suspend deliveries of 767 freighters and tankers for three months, and that followed a year-long hiatus in 787 production. Repair cycle time has doubled, due to extended waiting times for repaired components, from chips to raw materials. Airline and aircraft repair shops are increasingly relying on used parts to get aircraft back in the air. This has prompted lively activity in gutting older models to salvage parts.

It is obvious that the inability of companies to eliminate failures in the global supply chains system, as well as the use of outdated or low-quality parts, directly threatens the personal safety of passengers.

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[14]An Examination of Boeing's Supply Chain Management Practices within the Context of the Global Aerospace Industry // Chapter 5 URL: https://dspace.mit.edu/bitstream/handle/1721.1/33315/62312684-MIT.pdf?sequence=2

CHAPTER 3. UN ACTIVITIES ON THE IMPLEMENTATION OF PRACTICAL FLIGHT SAFETY MEASURES

As part of United Nations efforts to support the civil aviation industry through the disruption of traditional supply chains, ICAO has published a joint statement with seven UN bodies (UNCTAD, IMO, WHO, and others).

Through a joint document on the crucial importance of resilient and sustainably integrated supply chains to the global recovery from current challenges the International Civil Aviation Organization and seven other United Nations bodies have encouraged Member States to realize more effective coordination and cooperation between the transport modes and across borders[15]. It was emphasized that UN "is calls on all governments to maximize the contribution of international trade and supply chains to a sustainable socio-economic recovery, through greater use of international legal instruments and standards, as well as strengthened regional and sectoral cooperation"[16].

It points to a number of specific mechanisms, such as the United Nations TIR Convention (1975) and its eTIR International System, the CMR Convention and its eCMR Protocol and the Automated System for Customs Data (ASYCUDA), and international standards for data exchange, such as those developed by UN/CEFACT, noting that "these instruments allow for moving cargo across borders without requiring physical checks and for

[15]Air transport: Civil aviation security URL: https://www.europarl.europa.eu/factsheets/en/sheet/132/air-transport-civil-aviation-security

[16]Secretary-General's message on International Civil Aviation Day URL: https://www.un.org/sg/en/content/sg/statement/2021-12-07/secretary-generals-message-international-civil-aviation-day-scroll-down-for-french-version

reducing contact between people". For air transport, specifically, Member States have been invited to follow the key principles presented in the ICAO Council Aviation Recovery Task Force (CART) Report and implement its recommendations and guidelines[17].

The joint statement builds on the momentum launched by ICAO in the very early days of the Covid-19 pandemic to ensure the safe, secure and sustainable restoration of air connectivity. This momentum includes the development and then universal and cost-free provision of key technical guidance, and continuous advocacy for the pivotal importance of air transport to both recovery from the pandemic and the achievement of the UN Sustainable Development Goals.

To promote a sustainable trajectory for the aviation industry, government policies should prioritize sector-wide measures. In particular they need to:

- Strike the balance between the need for support and the risk of distorting competition. In instances where firm-specific support measures are necessary or have been implemented already, these should not tilt the playing field with other firms in the aviation industry[18].
- Preserve business dynamics and allow exit. As demand may be structurally different from that before the crisis and possibly lower, governments should foster restructuring and avoid backing non-viable firms, but support displaced workers.

[17]Review Of Air Travel Policies In The United Nations System: Achieving efficiency gains and cost savings and enhancing harmonization. // International Civil Aviation Organization // Chapter 2 URL: https://www.unjiu.org/sites/www.unjiu.org/files/jiu_document_files/products/en/reports-notes/JIU%20Products/JIU_REP_2017_3_English.pdf

[18]The Case for Fair Competition in Europe's Aviation // European Cockpit Association URL: https://www.eurocockpit.be/sites/default/files/2017-04/The_case_for_fair_competition_in_EUs_aviation_14_1125_online_F.pdf

- Encourage investments in the green transition and thereby increase the long-term resilience of the aviation industry, for instance by making firm-level support decisions contingent on environmental improvements.
- Address sustainability along the whole aviation value chain, including aircraft manufacturers and airports. As coordination across sectors and with other policies is crucial, policy responses to the crises in the aviation industry should be integrated in the low-carbon transition strategies implemented or under discussion in many OECD countries.
- Governments have to strike the balance between support to the aviation industry and the need to preserve competition, in particular when considering firm-specific measures.
- Policy interventions should encourage investment to improve the sustainability of the aviation industry[19].

Moreover, rather than focusing on large players, interventions should ensure that young firms and start-ups are included, for instance through complementary measures. Failing to include young firms may lead to excessive consolidation by the largest players[20].

Such coordinated packages of policy measures can contribute to addressing societal challenges, in particular by co-ordinating all stakeholders and ensuring the consistency and complementarity of public and private investments[21].

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[19]Safety Management System URL: https://www.faa.gov/about/initiatives/sms/explained/components
[20]Commercial Air Travel Safety Guidelines URL: https://popp.undp.org/policy-page/commercial-air-travel-safety-guidelines
[21]IATA Releases 2022 Airline Safety Performance // IATA URL: https://www.iata.org/en/pressroom/2023-releases/2023-03-07-01/

Having analyzed the activities or reactions of the UN regarding the field of civil aviation during the disruption of global supply chains, we can conclude that the statements of the UN bodies are mainly declarative. No decisions or documents have been adopted so far. In this regard, the member States of the organization need to formulate concrete and clear steps to stabilize the situation.

CHAPTER 4. FLIGHT SAFETY DEVELOPMENT SCENARIOS ON ACCOUNT OF SUPPLY CHAIN INSTABILITY

To build the scenarios, the EREA study on the potential future of aviation by 2050 was taken as a basis. The scenarios presented below are used to understand the potential impacts on the future of civil aviation.

There is great uncertainty as to when the aviation sector will recover from the effects of the current global supply chain disruption crisis. The constructed trends based on the current conditions and context allow us to present four alternative options for the future of civil aviation. However, none of the scenarios are designed to be absolutely realistic, but they serve as a means to explore options and ideas.

[15]Air transport: Civil aviation security URL: https://www.europarl.europa.eu/factsheets/en/sheet/132/air-transport-civil-aviation-security

[16]Secretary-General's message on International Civil Aviation Day URL: https://www.un.org/sg/en/content/sg/statement/2021-12-07/secretary-generals-message-international-civil-aviation-day-scroll-down-for-french-version

	**Mad Max** ...aviation: a luxury for the few in a world of consumerism, challenges and conflict	*A world characterised by deglobalisation and fragmentation; extreme nationalism and populism; instability; protectionist economies; high levels of inequality; low sustainability; climate crisis; low levels of R&D.* *Aviation is an expensive, luxurious and highly desirable product but is unreliable due to climate change and different sources of instability. There are few industrial players with no innovation and limited R&D.*
	**Tech for You** ...aviation: side by side alternative technology in islands of choice, competition, and customisation	*A world characterised by multipolarity and competition; high-cost, low economy-of-scale production offset by widespread automation; market driven by consumer choice and desires; free market economies; high R&D with national and short-term focus; different approaches to and meaning of sustainability in different islands.* *Mobility is flexible with air transport part of the local, intermodal transport system. The overall approach is to strive for door-to-door mobility.*
	**Stripping Down** ...aviation: sustainability achieved by a world of centralised command and control	*A world characterised by political stability; command economies; centralised government; prescriptive regulation; slow but stable economic growth; standardisation and uniformity; prioritised and government-directed sustainability.* *There is limited and highly controlled mobility due to high prices, security threats, flight shaming and regulation. Sustainable intermodal generic solutions are enforced. There are few industrial players due to high cost and low demand.*
	**Optimising Together** ...aviation: unlimited freedom in a world of common purpose, collaboration and cohesion	*A world characterised by unification and harmony; global cooperation and collaboration; global legal and institutional frameworks; high stability and growth; sustainability; market-driven economies and liberalisation; high standardisation and confidence.* *Mobility is growing and is fully sustainable. Different aviation solutions are available for all journey segments from UAM through formation flying to suborbital flights.*

Table 3. The Scenarios for the Future of Aviation[22]

[22]Erea Future Of Aviation – The Research and Developments. P.23 URL: https://erea.org/wp-content/uploads/2021/06/EREA-Future-of-Aviation-RD.pdf

To form a full vision of potential flight safety risks, let's explore main supply chain jeopardies that somehow leave their mark on the field of civil aviation[23]:

- **Global political instability.** In recent years, there has been an increase in complex geopolitical problems, which, unsurprisingly, can lead to a global shortage of energy and raw materials, which will affect production planning and logistics in the supply chain. However, there are ways for companies to help keep their production lines and supply chains running. One strategy is to map, monitor, and measure your exposure to geopolitical events at all parts of the supply chain and access points to ensure a faster response to events as they occur. For example, creating a more diversified supplier network and establishing direct communication with your logistics partners can allow you to change quickly in the face of disruptions.
- **Inflation.** To thrive in times of economic turmoil, supply chains must be responsive. Intelligent digital solutions also offer powerful forecasting and planning tools, such as digital twin technology, which allows you to virtually recreate your supply chain by simulating response and performance in various inflation-related scenarios.
- **Changes caused by climate change.** The environmental crisis has a significant impact on the future of the international supply chain and one of its main manifestations is climate change associated with greenhouse gas emissions. With regard to climate change, the creation of a "green supply chain" is required, involving the integration of environmental requirements into the supply chain management system around the world. All this

[23]Assessment of the Most Appropriate Measures for Mitigation of Risks in the Agri-Food Supply Chain URL: https://www.mdpi.com/2071-1050/15/12/9378

testifies to the reformatting of the global supply chain that has begun and the strengthening of business localization trends. The destructive processes taking place in the global supply chain are likely to lead to profound and long-term changes in international logistics. They will be characterized by a combination of further globalization of production and marketing of products with an increase in the importance of localization of those industries that are essential for maintaining national economic security and sustainable development.

- **Logistical risks.** In order to minimize disruptions in the supply chain, you must dynamically adapt transportation methods using real-time information. Automated cargo management processes, cloud collaboration, and standardized cargo documentation can also help offset these risks.

Risk reduction strategies in the supply chain

The types of risks faced by the civil aviation sector are changing, but so are the intelligent technologies that help enterprises improve their risk management strategies in the supply chain. Here is a summary of some useful methods of detecting, assessing, planning and implementing risks[24].

- Getting a broader overview of your value chain and suppliers with cloud-based software that provides analytics and key performance indicators to monitor performance globally and at the enterprise level.
- Real-time supply chain monitoring by using technologies such as artificial intelligence, advanced

[24]Aqlan, Faisal & Lam, Sarah. Supply chain risk modeling and mitigation // International Journal of Production Research. P. 14. URL: https://www.researchgate.net/publication/277944062_Supply_chain_risk_modelling_and_mitigation

analytics for real-time alerts that reduce response time.

- Quick reaction changes by reallocating resources and switching to short-term contracts.
- Regionalizing the search for suppliers using nearshoring, friendshoring to reduce dependence on global suppliers in times of delays and instability.
- Improving supplier relationships by diversifying the supplier base and simplifying supply chain planning and collaboration based on data exchange.
- Developing risk-based supply chain plans by running simulations, predicting the impact of factors such as increased demand through scenario planning and using advanced data analysis to obtain information about all risks[25].

[25]Digital transformation: Raising supply-chain performance to new levels URL: https://www.mckinsey.com/capabilities/operations/our-insights/digital-transformation-raising-supply-chain-performance-to-new-levels

CONCLUSION

Civil aviation is a strategically important industry for each State, but it cannot realize its potential without a global network. Civil aviation also makes a significant contribution to social well-being: it ensures the mobility of citizens by connecting remote regions, and also ensures the delivery of basic necessities around the world.

However, as for any industry, there are direct security and safety challenges for civil aviation caused by the destruction of traditional supply chains due to various types of crises, such as the pandemic or geopolitical factors.

As the system begins to work at the limit of its capabilities, the impact of even small failures increases, and stability or the ability to mitigate the consequences of failures and recover from them is compromised.

In connection with the above, the future development of the global supply chain is to change significantly, this will be influenced by the localization of business, a decrease in the volume of material flow between countries, the rationalization of cargo transportation and delivery systems with a possible reduction in the transport aspect, and the beginning of a change in the structure and conditions of international trade.

It is expected that in the near future the civil aviation industry will recover and continue to grow due to trends such as digitalization and automation, supplier diversification, as well as sustainable development and environmental responsibility.

To succeed in the civil aviation industry, companies need to adopt a more flexible and sustainable approach to their supply chains, using digital technologies, collaborating with suppliers, and ensuring sustainable development and innovation. By doing so, they can reduce costs, increase efficiency, and create more

sustainable and responsible products and practices.

Future delegates are faced with the task of considering not only these problems, but also, identifying new ones and proposing their own ways to solve them.

GLOSSARY

- **Acceptable level of safety performance (ALoSP)** – the minimum level of safety performance of civil aviation in a State, as defined in its State safety program, or of a service provider, as defined in its safety management system, expressed in terms of safety performance targets and safety performance indicators.
- **Accountable Manager** – the manager who exercises authority on behalf of the Operator for ensuring that all prescribed actions are performed to the standard required by the Authority. When authorized by the Authority, the accountable manager may delegate all or part of his or her authority in writing to another person within the organization, who becomes the accountable manager for the matters delegated (e.g. CEO, president, managing director, director general, general manager)
- **Accountable Officer** – the Officer of the UN who is overall responsible for air transport operations and aviation safety and who exercises authority on behalf of the UN organization for the management of air transport and aviation safety.
- **Crew Resource Management** – a program designed to improve the safety and efficiency of flight operations by optimizing error management, through the effective use of all available resources, by the flight crew.
- **Global safety management system** – a systematic approach to managing safety, including the necessary organizational structures, accountabilities, policies and procedures.
- **Global supply chains** – a cross-border organization of processes necessary for the production of goods or services and their transfer to consumers, using

various inputs and stages of development, manufacture and delivery.

- **Friendshoring** – a sibling to "nearshoring," is shorthand for the practice of relocating supply chains to countries where the risk of disruption from political chaos is low.
- **Maintenance** – the performance of tasks to ensure the continuing airworthiness of an aircraft, including any one or combination of overhaul, inspection, replacement, defect rectification, and the embodiment of a modification or repair.
- **Nearshoring** – the practice of transferring a business operation to a nearby country, especially in preference to a more distant one.