ПОВІТРЯНЕ, КОСМІЧНЕ, ЕКОЛОГІЧНЕ ПРАВО

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AIRPORTS AND THE ENVIRONMENT

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Purpose: *the idea of sustainability in environment elevates by ground handling of airports are highlighted and the importance of governance policy of development planning of national airports in accordance to international standards with the engagement of communities as well as effective airports' management as part of the policy planning process for national airports sustainability will be discussed.* ***The methodological approaches of this paper includes*** *philosophical, general scientific and special judicial methods.* ***Results:*** *national airport development planning policies must comply with the requirements of the high-level environmental assessment principles, which improve the ability to apply a consistent approach to the environmental impact of ground-based operations at the airport. International principles and standards to environmental protection from airport's main negative impacts have to be studied for further implementation into national legislation, public policy and civil society's consciousness for the purpose of practical application by airport's management.* ***Discussion:*** *Strategic Objectives of International Civil Aviation Organization on environmental protection concerns; some of the main environmental and sustainable development concerns raised with respect to the operation of airports are emissions, noise issues, land use by airports, energy consumption, wastes.*

Keywords*: airports; ICAO regulations; environment protection; Sustainable Development Goals; Environmental Management System.*

Problem statement and its relevance. The main United Nations Sustainable Development Goals (UN SDGs), which were adopted on September 25th, 2015 to end poverty, protect the planet and ensure prosperity for all as part of a new sustainable development agenda [1]. Strategic Objectives of International Civil Aviation Organization (ICAO) are strongly linked to 15 of the 17 United Nations Sustainable Development Goals (SDGs). The Organization is fully committed to work in close cooperation with States and other UN Bodies to support related targets [2].

Governance policy of planning national airports' development should meet the requirements for high-level environmental assessment principles intended to facilitate the use of a consistent approach for assessing the environmental impacts of operational changes during the ground handling operations in the airport. International principles and standards to environmental protection from airport's main negative impacts have to be studied for further implementation into national legislation, public policy and civil society's consciousness for the purpose of practical application by airport's management.

Environmental issues relating to airport operations such as air and water quality, land management, noise, and climate change, has required States to respond with sound policies, plans and procedures. These include both voluntary and regulatory measures to achieve a balanced approach to environmental management. The compatibility of an airport with its environs can be achieved by proper planning of the airport, management of pollution-generating sources, and land-use planning of the area surrounding the airport.

Analysis of research and publications. Environmental aspects of civil aviation are widely studied by such domestic and foreign scientists, as Overkovska T.K., Khomyachenko S.I., Kostytskyi V.V., Yeryashov E.K., Boyarska Z.I., Krasnova Yu.A., Babak V.P., Kharchenko V.P., Maksymov V.O., Sigifredo Castro, Lawrence C. Davis, Larry E. Erickson, H.L. Rogers, D.S. Lee, D.W. Raper, P.M. de F. Foster Frank Boons, Arwin Van Buuren, Geert Teisman and others.

Purpose of the article. The main concerns of environmental sustainability raised by ground handling of airports are highlighted and the importance of governance policy of development planning of national airports in accordance to international standards with the engagement of communities as well as effective airports' management as part of the policy planning process for national airports sustainability will be discussed.

The presentation of the main material. Improving the environmental performance of aviation is a challenge ICAO takes very seriously. In 2004, the 35th Session of the ICAO Assembly adopted three major environmental goals, which have been reaffirmed in all subsequent Assembly Sessions:

a) to limit or reduce the number of people affected by significant aircraft noise;

b) to limit or reduce the impact of aviation emissions on local air quality; and

c) to limit or reduce the impact of aviation greenhouse gas emissions on the global climate.

In 2010, during the 37th meeting, ICAO has been re-confirmed its responsibility and its members in achieving the highest level of balance between security and the sustainable development of civil aviation, on one hand, and strict control relating conditions of environment quality, on the other hand [3].

ICAO policies and practices related to environmental protection are revised and updated every three years by the ICAO Assembly. Currently, these policies and practices are included in Assembly Resolutions A40-17, A40-18 and A40-19, adopted in October 2019 [4].

The ICAO Council also adopted a Strategic Objective on Environmental Protection, which is to minimize the adverse environmental effects of civil aviation activities.

The strategic objective on environmental protection is:

"Minimize the adverse environmental effects of civil aviation activities. This Strategic Objective fosters ICAO's leadership in all aviation-related environmental activities and is consistent with the ICAO and UN system environmental protection policies and practices" [5].

Airports are a critical component of the complex international air transport system that supports and facilitates the movement of passengers, air cargo and tourism all around the world [6].

Over the past 20 years or so the awareness of the environmental impacts of human activity has increased substantially [7, p. 61]. Accordingly, the long-term survival of businesses is becoming increasingly dependent upon their ability to recognise and act upon societal and technological change [8, p. 15]. Thus, businesses are under greater pressure to define and adopt more environmentally conscious practices and to operate in a sustainable manner [9, p. 366]. One of the greatest threats to the air transport industry, and, specifically, the airport industry's ability to grow and operate in the future is climate change [10, p. 17]. Due to this focus, the airport industry is confronting the impact of growing environmental pressure [11, p. 118]. Accordingly, there has been greater attention paid to the impact that airports have on the environment and airports are working to make themselves more environmentally responsive [12, p. 15].

Airports, with the facilities and services they provide, are considered as one the most important parts of the infrastructure required for the regular operation of aircrafts. [13, p. 56]. Another important component of this infrastructure is Air Traffic Control Services. Airports considerably contribute to local economy and employment. However, together with the socioeconomic benefits they offer, environmental costs and impacts are the inseparable results of the operation of airports. Following the increasing demand for air travel of passengers and cargo, aviation industry is anticipated to grow further and this means more incentives and driving forces for building new airports or expanding the existing ones, and this will intensify the significance and complexity of envi-

ronmental and sustainable development concerns. Some of the main environmental and sustainable development concerns raised with respect to the operation of airports are emissions, noise issues, land use by airports, energy consumption, wastes [14, p. 3].

The anthropogenic negative effects on the Earth's climate are one of the most important environmental issues the aviation industry has faced [15, p. 3]. Emissions from aircraft, both at ground level and at altitude, can give rise to numerous negative effects on air quality, climate and the ozone layer. The gases and particles emitted from aircraft engines can cause harmful effects in different stages of the flight, from the ground to higher altitudes. At ground level, where airports are involved, one of the adverse effects of aircraft emissions is degradation of the air quality, which may directly impact human health [16]. According to the environmental reports and assessments, particulate matters, NOx, HC, SOx, and CO from aircraft engine emissions can affect air quality, health and welfare [17]. Aviation-related emissions in the ground level and airport vicinities do not limit to aircraft emissions; ground support equipment are other contributors. This means that air pollution from the airport ground-service vehicles, as well as the airport surface access systems should be considered as part of the environmental burden of the airports.

Since the emergence of the aviation industry, aircraft noise has been one of the most important sources of excessive noise generated by human activities. With respect to the problem of excessive noise in the vicinity of airports, airport operator need to reduce aircraft noise emissions, reduce the number of people exposed to excessive noise levels, and finally help local community receive the airport's plans and activities [18]. Solutions such as urban planning, applying new technologies and designs, and restricting operation of particular aircraft types, frequency of flights and night-time flights, planning and managing land use, and redistributing noise by managing runways and routes use are some of the mitigative measures employed to meet noise quotas and prescribed limits [19].

Land use by airport, waste and ground congestion are among the problems which need attention of regulators as well as airport authorities in order to diminish the impacts on environment and social life.

Land take refers to utilization of land by airports for the purpose of building and operating airport related activities. Through effective operational procedures and increasing the capacity gains the need for additional land for building new runways and facilities will be avoided [13, p. 95].

Airports are a major source of various kinds of waste. Every airport must manage waste, and implementing efficient and cost-effective waste management practices presents many challenges. There is a wide range of sustainable practices that can make the management of waste at airports more economic and better for the environment. Furthermore, successful airport waste management implementation has the potential to positively impact airport authorities, customers and the surrounding community at large. Airports are local entities. Waste management at airports are therefore generally reliant on national/local regulation, drivers and realities. For instance, a municipality with waste reduction targets can influence an airport operator's waste management policy. Additionally, stakeholder's arrangements with the airport operator also vary from place to place (e.g. contracts, responsibilities) and may impact the ability of the airport operator to influence its stakeholders.

Minimizing overall waste throughout airports' operation and value chain entails not only maximizing the amount of reused and recycled items from waste, but also the consideration of social, economic, environmental, and operational aspects of waste in the broader context of airport management. It is imperative to engage airport management and ensure their commitment, define clear roles and responsibilities of stakeholders involved as well as share overall objectives [19].

Environmental Management, air quality and climate change mitigation at airports are ICAO's one of the main vectors for measuring and concerns.

As emerging issues require action, specific guidance material is developed by ICAO to identify, measure, and respond.

The ICAO Doc 10031 "Guidance on Environmental Assessment of Proposed Air Traffic Management Operational Changes" provide States, air-

port operators, air navigation service providers (ANSP) and other stakeholders with environmental assessment guidance to support decision making when analysing proposed air traffic management (ATM) operational changes.

The ICAO Doc 9184 – Airport Planning Manual – Part 2, Land Use and Environmental Management has formed the foundation on which proposed and operational airports can plan and manage the environment.

Additionally, air quality and climate change impacts are addressed in Doc. 10013 – Operational Opportunities to Reduce fuel Burn and Emissions and Doc. 9889 – Airport Air Quality Manual.

Balanced approach to aircraft noise Management is called as the goal for airports planning process. Airports are key stakeholders to improve practices on the ground. ICAO Doc. 9829 – Guidance Approach on the Balanced Approach to Aircraft Noise Management encompasses four principal elements: reduction of noise at source; land use planning and management; noise abatement operational procedures; and, operating restrictions on aircraft.

For managing environmental matters at an airport, along with sustainability plans, certifications Environmental Management System (EMS) provides a methodology and framework to systemically identify and cost-effectively manage significant environmental aspects of aviation organizations' operations and have proven effective across a wide range of organizations, including airports, air carriers, manufacturers and government agencies" [20, p. 1-2]. An Environmental Management System (EMS) is a set of management principles intended to identify, evaluate, monitor, and reduce the negative environmental impacts of an organization's activities. It benefits an organization by offering a systematic approach for assessing and controlling ongoing activities, increasing environmental awareness, and complying with relevant regulations. An EMS provides many different and useful tools for detecting, understanding and managing those elements involved in its activities, products and services which have the potential to impact the environment.

Ensuring the sustainability of the airspace that aircrafts share has been a concern for environmental activists for the last few decades. One of the strategies to reduce the adverse effects of aviation on the environment is developing operational measures, one of which can be accomplished through improvement of air traffic management (ATM) services. "The most important fuel saving opportunities come from ATM systems that permit more direct routings and the use of more efficient conditions such as optimum altitude and speed. Shortening routes can indeed significantly reduce CO2 emissions" [21]. ATM and other operational procedures, reportedly, can reduce aviation fuel burn between 8% and 18% [22]. However, fuel efficiency through ATM operational procedures requires that institutional and regulatory arrangements be applied at both the national and international levels. Operational measures are considered an effective and quantifiable means of minimizing aircraft emissions, with near-term results [21]. Therefore, the contribution of ATM systems to the protection of the environment, both in the implementation and operation of the global ATM system and the global air navigation plan, is encouraged.

Conclusion. Each sustainability module can be developed as a major component, contributing to a sustainable future in the development of airport complexes. A sustainable aviation industry is predicated on cooperation and common effort from the industry as a whole. Regulatory intervention has always had a great impact on transportation industry, and the issues related to environment have been an important reason for such intervention. Policy makers and regulators have a key role in ensuring that in regulating the air transportation industry the interests of society as well as the local community are well taken into account. Governments as part of the policy planning process for transportation should consider protection of people against health hazards which may be accompanied by such activities as a top priority.

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АЕРОПОРТИ ТА ЗАХИСТ НАВКОЛИШНЬОГО ПРИРОДНОГО СЕРЕДОВИЩА

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Автор статті зосереджує свою увагу на взаємозв'язку основних цілей ООН щодо сталого розвитку, які були прийняті 25 вересня 2015 року для ліквідації бідності, захисту планети та забезпечення процвітання для всіх, як частина нового порядку денного сталого розвитку, та стратегічними цілями Міжнародної організації цивільної авіації (ІКАО). Організація повністю зобов'язана працювати у тісній співпраці з державами та іншими органами ООН для підтримки відповідних цілей.

У статті особлива увага приділяється аналізу основним проблемам екологічного та сталого розвитку, що спричиняються діяльністю та експлуатації аеропортів, зокрема, викиди, проблеми шуму, використання землі в аеропортах, споживання енергії, відходи.

Значне місце у статті автором надано дослідженню Системі управління навколишнім середовищем та вдосконаленню надання послуг з управління повітряним рухом як одним із важливих стратегій зменшення несприятливих впливів авіації на навколишнє середовище. Проблему захисту навколишнього природного середовища від впливів цивільної авіації широко досліджуються такими вітчизняними та зарубіжними вченими, як Костицький В.В., Харченко В.П., Максимов В.О., Лоренс К. Девіс, Ларрі Еріксон, Х.Л. Роджерс, Герт Тейсман та інші.

***Метою** статті є висвітлення основних проблем екологічної стійкості, викликані наземним обслуговуванням аеропортів, та важливості політики управління плануванням розвитку національних аеропортів відповідно до міжнародних стандартів із залученням громад, а також ефективного управління аеропортами як частини політики з метою формування процесу планування сталого розвитку національних аеропортів відповідно до міжнародних норм. Методологічна база цього дослідження складається з філософських, загальнонаукових та спеціальних методів.*

*В основу **результатів** цієї статті покладено аналіз основних негативних впливі, що здійснюють аеропорти на навколишнє природнє середовище, а також міжнародної регулювальної бази та технологій щодо їх зменшення з метою формування політики управління плануванням розвитку національних аеропортів, що сприятиме використанню послідовного підходу для оцінки впливу на навколишнє середовище експлуатаційних змін під час операцій з наземного обслуговування в національних аеропортах. **Дискусія** в статті торкнеться вдосконалення національного законодавства та відповідність міжнародним принципам та стандартам з охорони навколишнього середовища від основних негативних наслідків аеропорту з метою практичного їх впровадження керівництвом аеропортів та формування державної політики.*

***Ключові слова**: аеропорти; Правила ІКАО; захист навколишнього середовища; Цілі сталого розвитку; Система управління навколишнім середовищем.*