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## IMPACT OF RUSSIAN AGGRESSION ON UKRAINIAN AVIATION

It is quite difficult to assess the impact of the full-scale invasion of Russia on the territory of Ukraine on all spheres of life, considering the losses among the population. In addition to the destruction/damage of strategic objects - airfields, airports, and aviation educational institutions, the Russians caused a halt to the development and activity of Ukrainian aviation. To understand the whole picture of the negative impact, it is worth considering the key aspects that have marked significant upheavals since February 24, 2022. Therefore, in the context of this issue, we will consider all the main problems and the impact not only in Ukraine but also on the world community.

Thus, since the full-scale invasion of Ukraine commenced, Canada, the EU, the UK, the US and various other countries have banned Russian aircraft from their airspace. Russia has retaliated by banning 36 countries from flying through its skies. The mutual sanctions and air restrictions have shaken up the aviation sector, leading to the cancellation or rerouting of flights, increased air ticket prices, higher fuel costs and issues with titanium sourcing, among other issues.

To dive into the described question it is important to understand the prewar Ukrainian and Russian traffic. According to the data from the International Air Transport Association (IATA), Ukraine accounts for 3.3% of total air passenger traffic in Europe, and 0.8% of total traffic globally. Even though a relatively small portion of global traffic directly involved Ukraine, the war and associated sanctions have global implications for airlines and the work of IATA. Due to the invasion and following sanctions on Russian airlines the aviation organizations have faced lots of difficulties with their activity in several regions and their activities. The main ones are described below [1].

The first problem faced by international aviation concerned the suspension of flights not only to/from Ukraine, but also to neighbouring countries because Ukraine is a transit territory of two continents. The upcoming problem was the security of the systems and flights in the neighbour countries. For example, civilian traffic may unknowingly infringe on prohibited/restricted airspace

along the Ukrainian border that has been allocated for military operations. Such an infringement may be explained by Air Traffic Control (ATC) having had no up-to-date information on military actions/areas resulting in clearing a civilian flight unintentionally into a military area.

At the beginning of the full-scale invasion, russian government and russians themselves did a great cyber-attack on Ukrainian systems, including aviation. According to the report of the European Union Aviation Safety Agency during the war GPS signal manipulation that leads to navigation or surveillance degradation also takes place. Thus, due to military use of electronic warfare systems, the GPS signal may be disturbed in countries adjacent to the conflict zones and affect the operation of aircraft en route, during approach and departure and/or while operating at airports. The GPS interference may be only temporary, and pilots should be aware of this risk and the contingency procedures for loss of GNSS should be included in flight planning [2].

The next issue is related to the management and navigation of aircraft on an international level. The technologies of the 21st century give us lots of variations to make our life easier but more dangerous at the same time. Nowadays using drones, making non-standard operational air routes, etc. is a common thing in a war conflict. But this also has consequences and unregulated problems that still do not have a solution in International Legislation. As for the usage of the drones – it may inadvertently infringe on adjacent civil airspace, leading to losses of separation and a general disruption to operations. In additionally to conducting military activities different non-standard activities may be added, such as drones patrolling or surveillance conducted bordering the conflict zone. Firstly, such an increase in activity in these areas may lead to an increase in ATCO coordination/communication workload. The extra work will affect capacity and increase the risk of airborne collision between civil traffic and unmanned aircraft. [2, 3]

Moreover, many aviation companies had a great economic impact on their activity as well-known international airlines gave their planes in leasing to Russian and Ukrainian operators. Some of these planes cannot be returned due to the complete suspension of flights over Ukraine. There are still flights over and in Russia despite the sanctions and restrictions but anyway, the owners of the planes and other equipment/transport cannot get their stuff back till the end of the war. Also, the new law of the Russian Federation that provides for the transfer of leased aircraft onto their register will allow these aircraft to continue operating. However, the sanctions imply that there is no access to/supply spare parts for aircraft maintenance. This may lead to parts being cannibalised, noncompliance with airworthiness directives, and a non-traceable aircraft maintenance history. This may result in the operation of unairworthy aircraft [2].

You may often see or hear the discussion of the listed issues in international

meetings, etc. but as for Ukrainians and Ukrainian aviation industry is much greater. Analyzing several interviews with the pilots, and owners of airlines in Ukraine we may assume that the airline industry in Ukraine will lose up to a few years of development compared to Europe, for example. Ukrainian aviation is facing one of the hardest challenges to solve – personnel qualification except for losing the income and the ability to work. In aviation, specialists cannot "stand still", but must constantly work and confirm their qualifications. It is not only about the pilots, but also about the technical personnel who maintain the planes, and about the dispatchers. In case the pilot does not have the opportunity to fly, he must train and prove his qualification at least on stimulators that are located abroad. The government of Ukraine has allowed the airline workers to leave the country despite the martial law but to get official permission and leave the border of Ukraine the worker should go through complex bureaucratic procedures, the training itself is expensive, so the union has to negotiate significant discounts or free training for pilots [4].

So, in conclusion of the above, I would like to emphasize that, despite the rather long use of air transport in the world, some questions remain open. In particular, issues related to the development/continuation of airline operations outside the country in which the war is being waged. The aviation situation of Ukraine is a precedent, because it is the territory through which many critical and logistical routes passed through the air territory of Ukraine, so its disappearance from the maps is a difficulty and expense for the whole world. However, at the state level, it is also critical to pay attention to the pilots and airline workers who currently remain in Ukraine, because over time they will not be able to confirm their qualifications due to lack of practice. For this, first of all, it is necessary to settle the issue of leaving the country and access Ukrainians to free training/training abroad.

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