

Globalization elements and their impact on air traffic

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Abstract

The article focuses on the issue of globalization and its impact on aviation. Respective globalization elements which take place in the field of aviation are studied. Also, the issue of terrorism and the elimination of possible risks resulting from this issue are paid attention to. The work further focuses the issue of safety, information technologies, systems of quality management in aviation and pays attention to the field of environment.

Key words: Globalization, safety, environment, terrorism, quality, information technologies

1. INTRODUCTION

Aviation is an important stimuli for globalization elements in the world's economy, politics, as well as in social field. It has significant qualitative and quantitative impact on tourism, international trade, direct international investments, economic structure and productivity on national, as well as on international scale. Besides air transport, the most critical part of aviation are airports and navigation service, if viewed in broader terms. When it comes to airports, air transport and navigation service, the most important globalization elements perceived more closely are environmental policy, terrorism and related safety, information, data and navigation technologies from the point of view of informatization, and on the other hand, from the point of view of economics, global alliances. The stimuli for globalization is technological development, liberalization of trade, culture and the Internet, preservation of the environment forming of common conscience. Globalization thus stands for the process of unifying

countries, cultures, and monetary economics. Its advantages lie in internationalization (access to flows), liberalization (causing immense growth of international trade) information technologies saving costs and time due to time-space compression, competition (increase in the variability of offer, quality and suppressing price levels). On the other hand, the disadvantages of globalization are „green issue“ (energy crisis), unemployment, unstable economics and economic gaps between countries, and dominant role of monopolies.

2. GLOBALIZATION ELEMENTS

Aviation industry and air traffic itself is a prototype of safety, speed, effectiveness and constant development tendencies and interconnecting information. All these attributes characterize globalization and separately define globalization elements. Elements, by which the effect of one provokes arising and impact of the other. They present a cycle with sections.

2.1 Terrorism

The phenomenon of terrorism under the conditions of today's society knows no boundaries between countries and includes in itself more and more complicating and developing relations. Aviation nowadays becomes a more and more frequent target of terrorist acts from among all fields of industry.

Airplane hijack

Airplane hijack represented actually the only serious form of illegal action in aviation, threatening lives of the passengers and crew up to the 70s. An airplane served only its primary function of "means of transport" and passengers became hostages back then, enabling hijackers to demand conditions, especially economic and political. This form became a part of the arsenal of terrorists and included all traits of terrorist act:

- political nature and motivation,
- influencing public opinion and the objective of medialization
- threats of using violence,
- creating fear and panic.

Hijacking a plane is the most outstanding proof of the international nature of terrorism, since it exceeds state borders and people fall victims regardless of their nationality. Tactics and process of hijacking a plane had been improving by terrorists, however safety precautions and acceptance of a number of international conventions aimed against air travel misuse resulted in a decrease in the number of hijacked planes since mid-80s.

The threat of crashing a large size plane on a major city first emerged in December 1994, when members of Algerian terrorist group called GIA took over Airbus A300 owned by Air France. The plane, after a series of complicated events landed at an airport near Marseille, and when French investigators were told by the released hostages, that terrorist have suicidal plans and that they aim to crash the plane in the center of Paris, an anti-terrorist assault took place. Hijacking other means of transport than a plane does not even come close to the number of hijacked planes. A breaking point in the history of terrorism, which is also connected to a change in the nature of international safety, is considered to be the attacks on World Trade Center and Pentagon, the seat of the Ministry of Defense on September 11th 2001. In this moment, an aircraft itself became an instrument and air travel became a means of committing an act of terrorism. September 11th 2001 changed the perception of the world and terrorist acts, and deeds from this era present a new level of safety issues in aviation and misuse of air travel. A number of international airports, such as Jalalabad (Afghanistan, February 28th), Burgass (July 14th 2002), Beijing (July 20th 2012). The highest number of victims (37 dead and 190 wounded) resulted after a bomb attack on January 24th 2011 at an international airport Domodedovo in Moscow.

2.2 Security

International terrorism represents a rather high potential risk for aviation. A modern international airport cannot operate without a high level of safety and revealing possible illegal actions. Globalization element of improving safety during air travel can be for instance using so called intelligent passports, or cards with safety chip, which includes a photo, biometrics and other necessary data required to identify a passenger.

A modern system for passengers' identity control and check, CAPPS II, serves to set the level of risk and possible threat which a passenger represents even before they board a plane. The system is also able to evaluate mutual relatedness of individual passengers, their connection to some of the existing terrorist groups etc. In case of a detected threat, a passenger is not allow to board a plane. The issue with using CAPPS II is the possible personal data misuse, false alarms, as well as the level of effectiveness of the program itself, which is uneasy to be traced.

Another safety element, which starts to spread globally to international airports is the whole body scanner, designed by a British research center. Via this, dangerous objects mounted to the body of a passenger are made visible. It was originally designed to improve orientation of soldiers and pilots in fog, however after the terrorist acts and endangering public aviation, it found use at airports' check-ins.

Biometrics technology is a standard in aviation as one of safety elements. It is based on identifying a person using biometric data. Biometrics include checking people on the basis of clear physical traits or unique characteristics such as face, fingerprints, eye color, DNA etc. Biometric scanners are designed to provide for a high level of safety, transparency, reliability and easy use. ICAO accepted biometric data as a means for biometric identification in passports and other machine-read documents in May 2003. Identification by face was chosen as a global biometric identification trait to prove personal identity.

2.3 Information technologies

Focusing on the future perspective of aviation, design, implementation and use of new information modules becomes a necessity.

Scheme of the integrated system of operation inspired incorporating a complex aviation information system KLIS into information-communication structure.

Integrated information system of operation in the field of aviation KLIS represents a multimodular system implemented in two phases:

- in the phase of introduction, the module of archiving collects important aviation, transport and other data
- in the phase of realization, the system is used with integrated information systems of operation:
 - AFTN – worldwide system of telecommunication circuits aiming to facilitate data transfer between AFTTN communication centers,
 - SITATEX – communication system serving to pass information mutually among air travel companies and airports used in aviation,
 - AMS – automatic monitoring system,
 - DCS – departure control system.
 - TWR – control tower enters the system by serving the function of taking the control over an airborne or landed aircraft

2.4 Navigation and data-information communication

The most frequently used cosmic technology in everyday life are satellite navigation systems, commonly known as Global navigation satellite system (GNSS). The whole world recently uses and utilizes a military solution of the American army known as GPS.

The world is however not a monopoly and various countries try to research and develop their own GNSS. For instance, there are Russian GLONASS, Chinese Beidou, Indian IRNSS, Japanese Quasi-Zenith, or European Galileo.

GNSS are vital for smooth and safe aviation and they take a significant place in it. This is exactly the reason which makes it one of the important globalization elements for the future, since with heavier and heavier traffic not only in the field of aviation they play an important role, and their importance is only about to grow. These systems will have to provide for speed, accuracy and availability of electronic data in a given time and place without any errors. Navigation in aviation, therefore availability of data and information, is necessary in all phases of flight. GNSS plays its role especially in the most critical phase, which is landing.

Recent GNSS systems and their development

GPS

The existing position system GPS was developed by the US army in 70s. The main condition is the ability to receive signal from at least four satellites. GPS is divided into three basic segments:

- Space segment – comprising satellites at the height of about 20,230 km above the surface of Earth, with a basic frequency of 10.23 MHz,
- Operating segment – land monitoring and radio centers worldwide (total of 12), which monitor satellites and their trajectories, set system time and navigation message for each satellite.
- User segment - devices to receive GPS signal

GPS system is constantly modernized, while the expected utilization will last till 2030.

GLONASS

Russian GLONASS was developed as a reaction to the American GPS. It comprises of, similarly, the following segments:

- Space segment – consisting of satellite at the height of 19,100 km, with a relatively short lifespan, which slowly degrades the system.
- Operating segment – in contrast with GPS, they are located exclusively in Russia
- User segment - compared to GPS, since the future of GLONASS is unclear, the number of the types of devices for receiving the signal is limited

EGNOS

Represents the first degree of European global navigation system (GMSS-1), extending the existing GPS and GLONASS, created as a mutual project of ESA, European Agency and EUROCONTROL (project began in 1996). Its purpose is to provide guaranteed navigation service based on navigation systems GPS and GLONASS to secure high accuracy, integrity and availability. Space segment consists of three satellites and processes signals from GPS and and GLONASS satellites. The land segment comprises of a site of monitored stations located in Europe.

EGNOS serves for testing use, to remove all errors and so that its successor, Galileo system (GMSS-2), is launched fully functional.

Outlook for the future tells us, that it is important to finish testing EGNOS and launch Galileo. To fulfill this task it is still necessary to launch a sufficient number of satellites to orbit, build the entire land infrastructure, introduction, testing and fine-tuning the system and following establishment among the competition, especially GPS. Planned functionality of the system is assumed in 2016. [7,8]

GALILEO

The main reason, besides lower and lower transport capacity, for the introduction of Galileo is to make this system independent from any state and army. EGNOS system does not meet this requirement. Galileo is supposed to be better than the contemporary systems in every way, even if it brings only a few innovations and new characteristics, however it pushes the recent ones a few steps ahead. This system shall be completely independent from other navigation systems, however they shall be compatible and it will use them. The system's conception follows these components::

- Global – shall consist of 30 satellites 23,616 km above Earth and land operation segment
- Regional – shall provide information on the integrity of signals, possible to combine with other GNSS and improved power
- Local – improvement of quality of services provided by regional component
- User – adjustment to the needs of users and devices receiving signal.

Galileo represents new European satellite navigation system developed in cooperation with European countries, as a request from civil sector and for civil use. Not even in cases of military or political crises it shall be blocked, which is important to secure smoothness and safety of aviation. It will be able to use the most modern technologies to inform on position and time and guarantee adequate availability and provide higher accuracy than the recent navigation systems, and shall offer the guarantee of continuity and quality of signal, which is a condition for the applications in aviation. Cooperation with the American GPS and Russian GLONASS is also crucial, which shall significantly improve the availability and reliability of navigation services, since all satellites in a given area shall be used. Another significant advantage is a warning in case the signal is not correct, which represents an immense utility for applications in the entire aviation process, where safety comes first.

2.5 Quality

Based on AS/EN 9100, AS/EN 9110, AS/EN 9120, AS/EN 9003 and other international norms, systems of quality management are used in the field of aviation.

AS/EN 9100 is a model of a quality system in aviation industry to secure quality in development, construction, manufacturing, service and installation.

AS/EN 9110 Quality system model in aviation industry to secure quality during repairs, general repairs and maintenance in the field of aviation.

AS/EN 9120 Quality system model in aviation industry during distribution and storing components.

The norms rely on the need to create a global harmonized norm meeting requirements of society in aviation industry worldwide. The norm ISO 9001 became the basis for AS/EN norms.

For the requirements of AS/EN 9100 to be accepted not only by American aeronautics manufacturers and repair companies, but also by manufacturers and repair companies in Europe, South America and Asia, IAQC (International Aerospace Quality Group) was created, which expresses ideas of world aeronautics manufacturers and repair companies in the field of quality. Its objective is to add a higher level of quality at all levels of the distributions chain. The core of IAQC is comprised of three

independent groups of the airspace quality:

1. AAQG (American Aerospace Quality Group):
2. APAQG (Asia-Pacific Aerospace Quality Group):
3. EAQG (European Aerospace Quality Group):

Each segment sets normalization organs responsible for checking the match with the respective standards. .

2.6 Strategic global alliances

The most preferred and the most favorite way of cooperation among aviation entrepreneurs recently are alliance groups, which result in covering the globalization demand for air travel and in broadening air traffic services. Basic part of the globalization cooperation is a unified idea of “the possibility of air travel to any part of the world”

Global alliance groups rely on the basic principle of the integration of air travel entrepreneurs, while any of them may offer their services in a specific part of the world or region and is coherent with the others.

Depth and scope of cooperation differs with different alliance groups, however the following fields are the common:

- Merger of check in and reservation systems – using Loyalty Programme – creation of a single alliance loyalty programme, or make it possible for the customer to use mutual benefits of loyalty programmes from each company
- Offering continuous prices do the alliance destinations: mutual agreement between alliance members connected with the transfer of passengers on a price, sum of which is lower than two companies tariffs combined.
- Harmonization of capacities offered for flights to major destinations and coordination of flight plans.
- Unified plane supply and repairs capacities
- Alliance offer of optional services for passengers
- Sharing and unification of other activities

The choice for the final decision of a company to join the alliance group should be made based on the evaluation of its contemporary position at the market of air travel, as well as on possible contribution coming from being a part of global alliance, however the most important condition for admission is a real evaluation of the possibilities of the company itself.

In the field of air travel, there are three major global multilateral alliance groups: Star Alliance, SkyTeam and OneWorld.

2.7 „The green issue “ of air travel

An element which is significantly affected by human is the issue of the environment. Environment and its preservation was always an issue, and always will be, in relation to other fields of industry as well in relation to aviation. Air travel burdens the environment mainly as for noise pollution and fumes.

Possibilities for lowering noise levels in air traffic may be reflected in the following four areas:

- regional planning,
- traffic limitations,
- lowering at the source,
- operation procedures

More serious and palpable effect of aviation on the environment are fumes, producers of which are not only aircraft. Fumes do not come only from planes, but also by operating vehicles in aviation, vehicles serving to commute between airports, and passengers' buses. Other sources of this kind of pollution should not be omitted as well, such as electricity generators or air conditioning devices, terminal buildings, power plants etc.

The initial idea is related to the fumes coming from the actual aviation means of transport, exclusively from plane engines. Global aviation produces about 2% of the global CO₂ fumes, which is a direct result of combustion. Recently, there are several alternatives to resolving the issue, which are mutually supported, and eventually contribute to one whole. Foremost, it is using aircraft with lower gas consumption. Connected to this are also innovations in the field of technical development and the design of new construction solutions for planes, mainly engines.

Pressure connected to resolving the "green issue" of aviation is put not only on the world aircraft producers, but touches also air travel entrepreneurs and countries' politics. Within EU member countries, one of the key instruments lowering the greenhouse effect fumes levels is the European system for emissions trading, issued based on Kyoto Protocol aiming to enable EU member countries meet the requirements stated in the protocol.

3. CONCLUSION

Aviation industry and air traffic itself is a prototype of speed, safety, effectiveness and Aviation industry and air traffic itself is a prototype of safety, speed, effectiveness and constant development tendencies and interconnecting information. All these attributes characterize globalization and separately define globalization elements. Elements, by which the effect of one provokes arising and impact of the other. They present a cycle with sections. Globalization is the current trend, which represents the unification of countries, cultures and economies. Negative effects of globalization, particularly terrorism and threat, leading to the implementation of new features aimed at enhancing aviation security and elimination of risks or threats eventually.

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