Scientific Journal of Silesian University of Technology. Series Transport
Zeszyty Naukowe Politechniki Śląskiej. Seria Transport

Volume 95 **2017**

p-ISSN: 0209-3324

e-ISSN: 2450-1549

DOI: https://doi.org/10.20858/sjsutst.2017.95.19

Journal homepage: http://sjsutst.polsl.pl

Article citation information:
Tłoczyński, D. Security as a determinant of choice of air transport service and air carrier on the basis of research. *Scientific Journal of Silesian University of Technology. Series Transport*. 2017, **95**, 213-222. ISSN: 0209-3324.
DOI: https://doi.org/10.20858/sjsutst.2017.95.19.

Dariusz TŁOCZYŃSKI[1]

SECURITY AS A DETERMINANT OF CHOICE OF AIR TRANSPORT SERVICE AND AIR CARRIER ON THE BASIS OF RESEARCH

Summary. The article presents the results of research among passengers using Polish airports in 2013 regarding safety issues. The main objective of the study was to prove the thesis that safety is not essential in the choice of air service. Based on the theoretical research, an overview of the issue of safety management is presented. Then, on the basis of the author's own research, safety as a factor in the choice of air transport is postulated. For this purpose, the role of safety in relation to other factors affecting the choice of air services is shown. Thereafter, the profile of a passenger for whom the issue of safety is a factor encouraging their choice of air service is presented.

Keywords: air transport; safety; airports; transport expectations.

1. INTRODUCTION

When analysing the global air transport market in 2014, some stability should be noted. It has even been visible in the last few years. There have been no spectacular events that have significantly effected changes in air traffic. However, it should be stressed that 2014 was a very safe year for air transport. That year, the International Air Transport Association (IATA) reported 12 plane crashes, which resulted in 641 deaths. However, when looking at the IATA's statistics for 2009-2013, an average of 19 disasters occurred and the number of

[1] University of Gdańsk, Armii Krajowej Street. 119/121, 81-824 Sopot, Poland.
E-mail: dariusz.tloczynski@ug.gda.pl

victims was 17 people per year. These data lead to the conclusion that travel by air is becoming more and more secure.

The IATA has calculated that, in 2014, one disaster was attributable to the 4.4 million flights, which gives a rate of 0.23 accidents per one million flights (in 2013, there were 0.41 accidents per one million flights). Therefore, this parameter is the lowest in the history of aviation. Similar data have been published by the Aviation Safety Network platform, whose indicator for the number of accidents per one million flights is similar to that of the IATA data.

According to the presented data, it should be assumed that air transport is an area with a high level of security. It can therefore be stated that security is not a significant factor in the selection of air transport among passengers using the analysed means of transport.

2. MODERN REQUIREMENTS FOR AVIATION SAFETY

An integrated security system is considered as an issue in terms of civilization and the system. Over the last few years, there has been continuous improvement in the safety systems within the transport sector. Progress has been made as a result of constant improvements in safety, predicated on the analysis of social solutions and systems. Firstly, there is widespread recognition of the human right to security. In the transport system, safety culture is a priority for the user of the system, who is seeking to be reassured about the safety of their environment. Of the utmost importance is the risk assessment of all modes of air transport. In the analysed branch, a system of risk analysis based on a culture of safety is observed. Broadly defined, a climate of security results in the adequate involvement of entities in the process of maintaining safety, as well as the provision of effective methods and proper attitudes among institutions, companies and individuals in this regard.

Solutions concerning the system mainly include methods and management tools, the integration of functions and activities, and coordination with other sciences, such as economics, management and psychology. The process of analysing safety systems in transport, which accepts, among others, the need to adapt to the standard organizational and technological solutions, is characterized by the formation of international agreements concerning the implementation of scientific and technical progress.

The basic element of safety management in air transport is the analysis of possible dangers, determining which factors influence safety and assessing the relationship between risk and applied preventive measures. An integrated system of air safety not only concerns activity related to air transport, but also the entire air transport system. The institutional system is very complex, made up of international, regional and corporate aircraft and associations. The ICAO is the organization responsible for the preparation and implementation of international regulations in the field of air transport.

At the EU level, the basic acts governing the issues of safety in air transport are:

- Council Directive 94/56/EC of 21 November 1994 on the Basic Principles Governing the Proceedings in Investigating the Causes of Civil Aviation Accidents
- Directive of the European Parliament and Council Directive 2003/42/EC on Occurrence Reporting in civil aviation
  Commission Decision No 2003/425/EC of 11 June 2003 Setting Up a Group of Experts on Accidents in the Transport Sector
- Commission Regulation (EC) No 1315/2007 of 8 November 2007 on Safety Oversight in Air Traffic Management

Directive 2003/42 / EC, Regulation (EC) No 1321/2007 and (EC) No 1330/2007 have been replaced by Regulation (EU) No 376/2014.

It is worth noting that international cooperation in the field of aviation safety also needs to facilitate the exchange of goods and services, which may impose a barrier in the form of a multitude of national technical standards. Therefore, with the main partners in the air transport sector (the USA, Canada and Brazil), the EU has entered into an agreement on the mutual recognition of security levels. Meanwhile, the EASA provides "working arrangements" relating to specific projects with industrial partners from countries that do not benefit from agreements on the basis of mutual recognition. The goods and services covered by these agreements and "arrangements" may be the subject of a free exchange between the respective countries/parties.

3. MODERN AIR TRAFFIC SECURITY RISKS AND SAFETY MANAGEMENT METHODS

When classifying the sources of danger in air transport, the following factors should be indicated:

- external (climate-related or environmental)
- internal (related to the organizational, functional and human factors)

Accident statistics prove that humans are the weakest link in the analysed system. For example, a member of the crew, an operator of a certain piece of equipment or a service person can make mistakes that cause risks, as a result of the following:

- Lack of knowledge (low level of training or incomprehensible tasks)
- Oblivion resulting from the lack of repetitions of procedures or activities (routine, lack of training)
- Insubordination caused by character
- Lack of control or motivation
- Lack of predisposition to a particular profession (health, personal characteristics)

In addition, errors are also made while designing and manufacture of aircraft, such as:

- Hidden errors of construction, occurring in the process of exploitation and threatening the safety of flights
- Inadequate diagnostic controls, maintenance and updates contained in the instructions
- Exceeding supplies in the form of mechanical and thermal strains, and voltage pulse pressures

The aircraft can also be a source of security risks caused by:

- Imperfections in the structure
- Mismatch between an operational programme and the nature of its usage
- Failure to comply with established performance standards
- Incorrect procedures and technology services
- Random damage to components and functional systems

A system of air traffic management can cause risks associated with:

- Inadequate preparation and transfer of information
- Poor weather forecasting

- Problems with radar controls and communication
- Poor or incomprehensible transmission of information and decisions taken during the flight

The environment and system of ground security measures can threaten safety during flight operations due to:

- Unexpected air problems and birds in flight
- Unexpected changes in weather and visibility
- Improper consumables (fuel, media)
- Improperly prepared aviation infrastructure
- Improperly functioning aviation infrastructure

Safety management in air transport is described in international aviation law. There are many definitions of safety management, but, in general, it can be defined as any activity aimed at reducing the risk of losses, taking into account the causes of accidents and dangers. The security level is determined by comparing the current level of safety with the target level of safety. Entities operating in the market for air transport services, which are responsible for maintaining an acceptable level of security, use a Safety Management System (SMS).

An SMS is a process used by organizations providing services or products related to safety, ensuring that all aspects of safety related to the service are considered.

The following mechanisms of safety management may be distinguished:

- Ensuring formal, unambiguous and creative approaches to safety management in order to achieve the required level of responsibility of the public air traffic management entity for the safety of air traffic.
- Extending the operation of all air traffic management and support services under the supervision of the public management of air traffic.
- Adopting, as a basis for action, a policy document on security issues, which defines the basic principles of safety management.

Measuring the effectiveness of an SMS requires the efficiency of safety indicators, targets of safety indicators and action plans to be defined. These key indicators and targets are representative of the overall risks in the operational context, in which the service provider operates and provides the monitoring process, based on the results, with an honest picture of the implementation of the SMS. By prioritizing the definition of a set of short- and medium-term objectives, specific to the service provider, through the implementation of strategies to mitigate the effects of risk for specific security purposes, and by setting measures and deadlines ensuring the effectiveness of mitigation strategies, the service provider shall provide oversight of the measurable means by which to check the level of security of the SMS or lack thereof, in addition to compliance with the rules.

4. ANALYSIS OF THE SAFETY EXPECTATIONS AMONG PASSENGERS USING POLISH AIRPORTS

In the period from July to November 2013, in all operating Polish airports, a study, which involved individual questionnaire-based interviews with passengers starting their journey by air, was carried out. The sample was 2,428 people, i.e., 0.01% of the number of passengers served by Polish airports in 2012. This was followed by layering a sample based on the number of passengers and taking into account the specificity of air traffic at each port. The

study included every fourth passenger aged 18-80 years in each analysed airport heading to the security checks at the time of research. The study was not carried out at the airport in Modlin because, during that period, the airport was not operational.

A prospective traveller considering a trip will look for information about the forms and means of transport using the following sources:

- Personal (family, friends, neighbours, acquaintances, colleagues)
- Commercial (advertising, travel agencies, employees, carriers and handling agents, ticket sales brokers)
- Public (mass media, consumer organizations)
- Experiential, related to the previous use of the product

The choice of each source depends on the specificity of air service and the individual characteristics of the purchaser. Each source of information fulfils a different role in the decision to purchase an air service. Commercial information generally performs the functions of information, and sources of personal sanctioning or assessing. As a result of gathering information, the consumer learns about competing offers.

Philip Kotler distinguishes several ways for assessing the decision-making process, while assuming that the consumer formulates conscious and rational opinions. However, it should be noted that the potential passengers, in different ways, evaluate the needs and significance of the individual characteristics of air services. That said, they pay the greatest attention to features that will benefit them. Most consumers, when deciding to purchase a service or product, take into account several features (transport expectations about the carrier), among others, travel time, availability, convenient time of departure, directness, low price, safety and routes.

In the current study, the most important factors as to why a plane is the preferred means of transport were travel time (91% of responses) and the directness of the connection (90% of responses). In contrast, factors that discouraged choosing air transport were reported as: procedures related to check-in (18% of responses) and other factors (37% of respondents, with these respondents most frequently indicating baggage limits [10%], queues and delays [7% each], fear of the use of air transport [6%], and the cancellation of a flight [3%]). Neutral factors (not encouraging, not discouraging the decision to use air transport) were: advertising by the carrier (91% of responses), loyalty to the carrier (85% of responses) and the carrier's brand (77% of responses).

The main factors influencing the decision to choose air transport were: travel time (27% of respondents), the directness of the connection (26% of responses), convenient departure and arrival times (17% of responses) and ticket price (15% of responses).

The passengers who declared that safety was a factor encouraging their use of air services generally travelled for these reasons:

- Business (38%)
- tourism (30%)
- Visiting friends (21%)
- Going to work (10%)
- Other (1%)

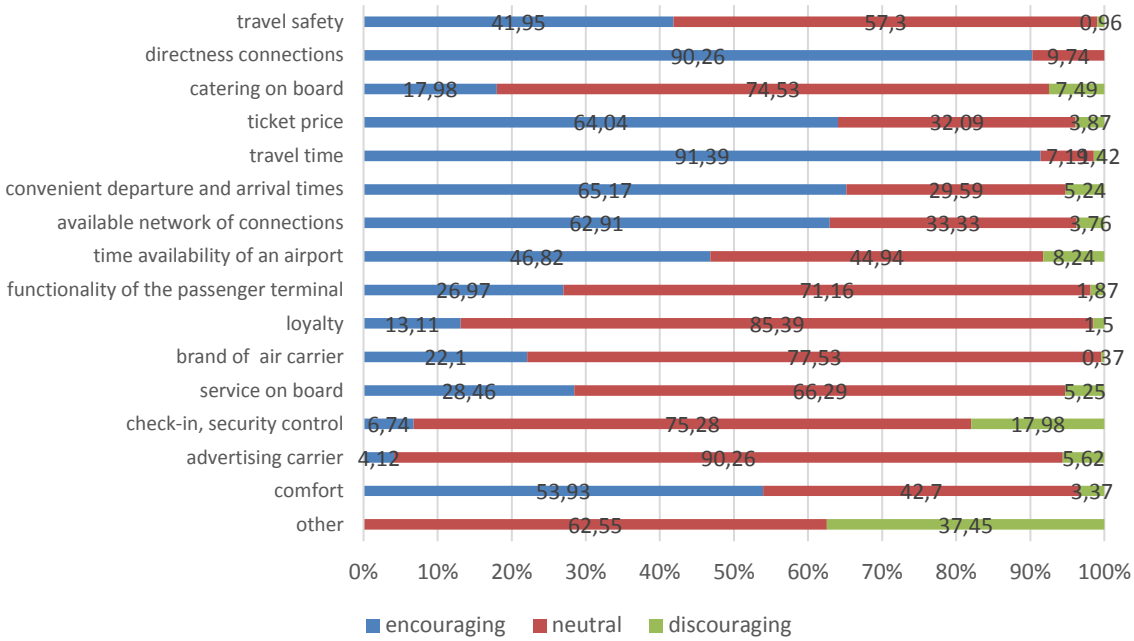

Fig. 1. The importance of the factors determining the choice of air transport among passengers at Polish airports in 2013

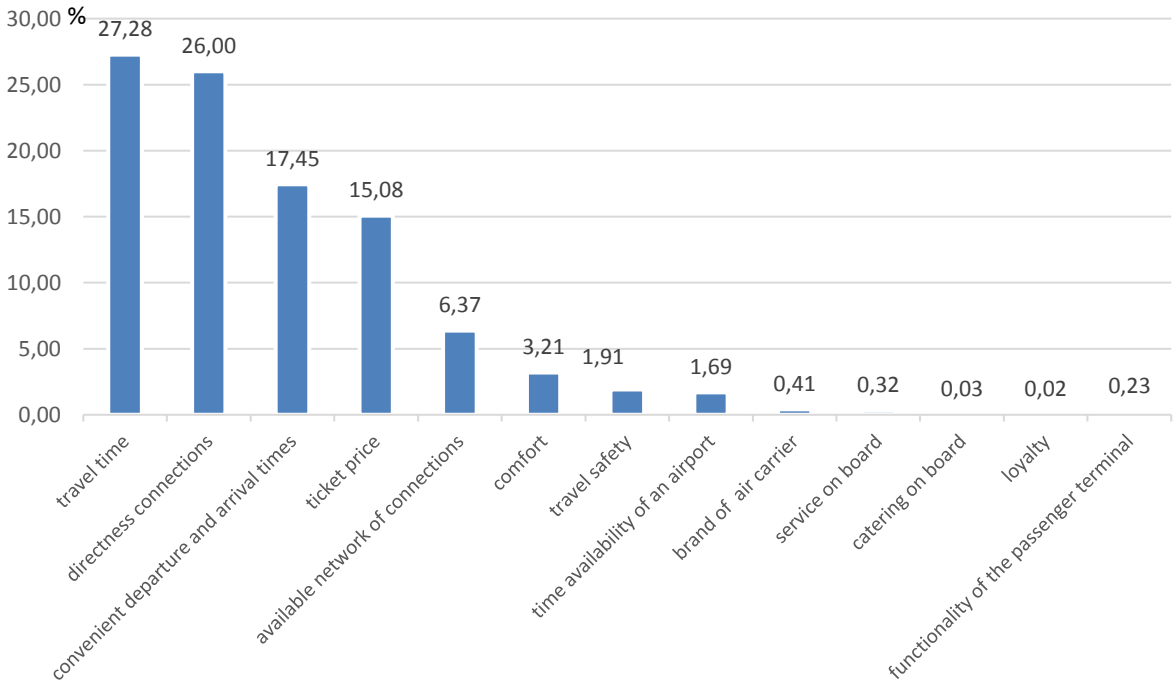

Fig. 2. Gradation of the factors that matter most when choosing air transport among passengers at Polish airports in 2013

In the analysed group, 52% made use of low-cost carriers and 48% chose traditional carriers. Over 4% of those using traditional carriers were people travelling in business class. Most passengers (83%) for whom safety has an impact on their choice of air services travelled on continental routes; the percentage was 8% for intercontinental routes, and 9% for domestic routes.

Among the group of people for whom safety was important when selecting air services, 27% travelled between three and five times a year and 26% travelled one or two times a year. Meanwhile, for 18% of those asked, this was the first trip during the year. 19% travelled six or more times a year.

26% of the analysed population were executives, 20% were employees without any managerial position, 18% were specialists, and 11% were managers of a company.

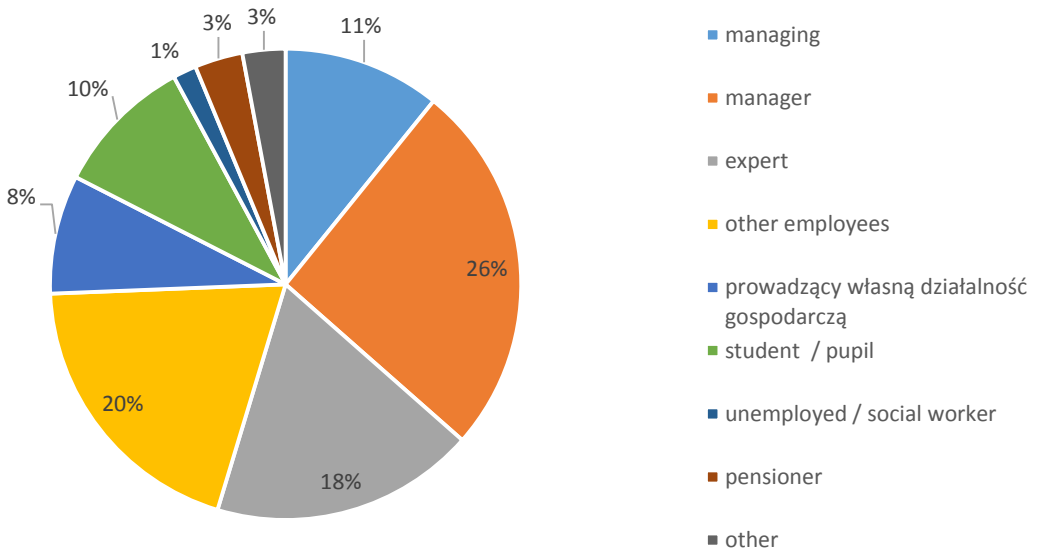

Fig. 3. The professional status of passengers for whom safety has an impact on their choice of air transport services

For 58% of male respondents, the choice of air transport services is affected by safety expectations. More than 38% were people aged 31-40, 26% were aged 21-30 years and 22% were aged 31-40.

36% of the analysed segment of the market live in large cities (over 200,000 inhabitants), 33% live abroad, 16% live in small towns (less than 50,000 inhabitants), 10% live in cities with a population between 100,000-200,000, and 5% live in cities with 50,000-100,000 inhabitants.

When analysing the profile of passengers using Polish airports in 2013 for whom safety is an important factor in the choice of air transport services, it should be stated that this profile is a person aged 31-40 years, who lives in an urban area, mostly travels on continental routes and on business three to five times a year, and holds a managerial position.

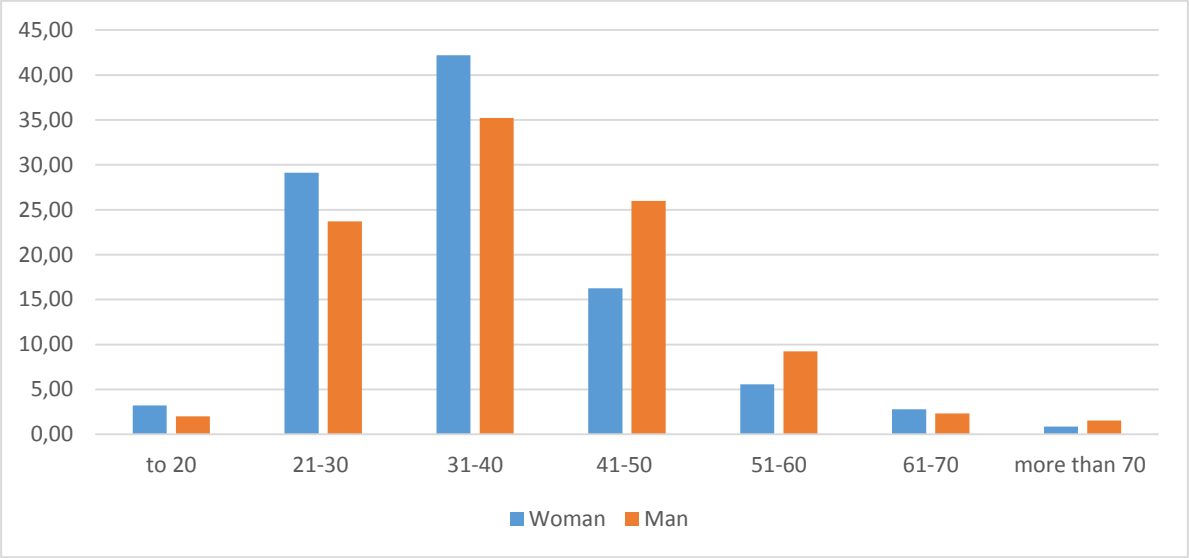

Fig. 4. The age structure of the passengers in Polish airports, according to sex, for whom security plays a role in their selection of air services

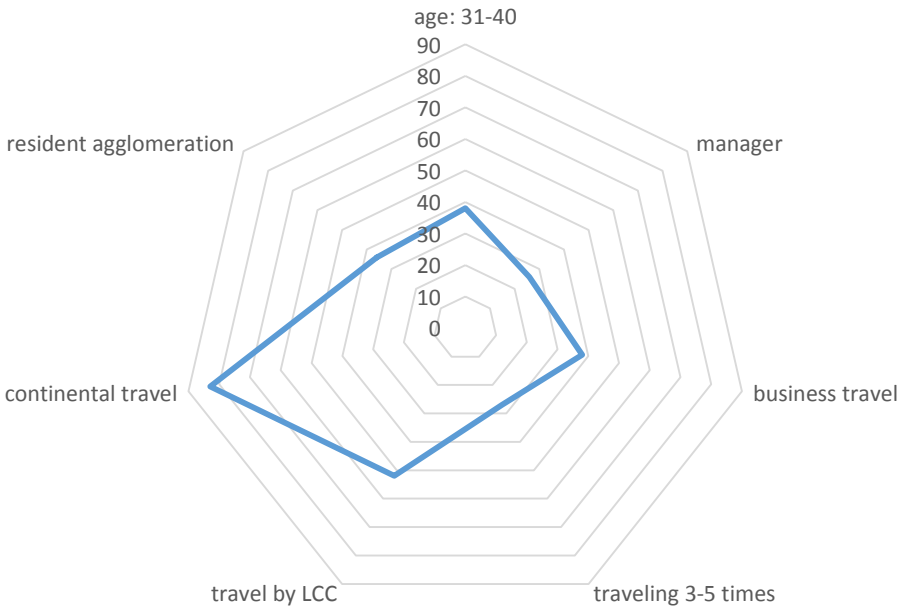

Fig. 5. Profile of passengers at Polish airports for whom their choice of air transport services is influenced by safety

Only 3% of all responded passengers regarded safety as a factor of competitive advantage in the choice of an air carrier. The main factors of competitive advantage were: travel time, the network of connections, price, and convenient arrival and departure times.

5. SUMMARY

The issue of safety is important when introducing a new product (service) on the market. Manufacturers of aviation equipment, air carriers and aviation infrastructure operators produce products with a high standard of safety. Such a requirement is primarily imposed by the market, but is regulated by international aviation authorities.

A passenger who chooses to travel by air or chooses a particular carrier assumes and believes that all the necessary requirements, in terms of safety in air transport, are met. The passenger expects operators to offer a safe service, ensuring a comfortable trip.

Therefore, safety expectations are not decisive when choosing air transport services. Only 2% of respondents using Polish airports in 2013 claimed that safety has an impact on their choice of air transport services, while 57% of respondents declared that the level of safety is a neutral factor when choosing air transport services.

References

1. Kotler P. 2005. *Marketing, Publishing Rebis.* Poznań: Prentice Hall
2. Kotler P. 1994. *Marketing. Analysis, Planning, Implementation and Control*. Warsaw: Gebether & Ska.
3. *Polish-English Dictionary ESARR - Official Journal of the ULC No. 5*.
4. Shennhan J.J. 2003. *Business and Corporate Aviation Management*. New York, NY: McGraw-Hill.
5. Krysta R. (ed.). 2010. *Integrated Transport Safety*. *Volume III. The Concept of Integrated Transport Safety System in Poland.* Warsaw: WKiŁ.
6. Krysta R (ed.). 2010. *An Integrated System of Transport Safety. Volume I. Diagnosis of Transport Safety in Poland*. Warsaw: WKiŁ.
7. Zurek J. 2009. "Scientific and technical research support accident." In: Jancelewicza B. (ed.). *Safety and Reliability of Aviation*. Torun: Adam Marszalek.
8. IATA. 2015. *IATA Safety Report*. Montreal: IATA.
9. Commission Decision 2003/425/EC of 11 June 2003 Setting Up a Group of Experts to Advise the Commission on a Strategy for Dealing with Accidents in the Transport Sector.
10. Directive 2003/42/EC of the European Parliament and of the Council of 13 June 2003 on Occurrence Reporting in Civil Aviation.
11. Council Directive 94/56/EC of 21 November 1994 Establishing the Fundamental Principles Governing the Investigation of Civil Aviation Accidents and Incidents.
12. Commission Regulation (EC) No 1315/2007 of 8 November 2007 on Safety Oversight in Air Traffic Management and Amending.
13. ICAO. 2013, *Safety Management Manual (SMM). DOC 9859, AN /474, ed. 2013*. ICAO: Montreal.
14. Xu Chengcheng, Zhibin Li, Wei Wang. 2016. "Short-term traffic flow prediction using a methodology based on autoregressive integrated moving average and genetic programming". *Transport* 31(3): 343-358. DOI: http://dx.doi.org/10.3846/16484142.2016.1212734.
15. Cunningham Mitchell L., Michael A. Regan 2016. "The impact of emotion, life stress and mental health issues on driving performance and safety". *Road & Transport Research* 25(3). ISSN: 1037-5783.

16. Ma L., Gao Y., Yin T. et al. 2017. *Wuhan University Journal of Natural Sciences* 22(3): 269-276. DOI: 10.1007/s11859-017-1246-1.
17. Woch M. 2017. "Reliability analysis of the PZL-130 Orlik TC-II aircraft structural component under real operating conditions". *Eksploatacja i Niezawodnosc - Maintenance and Reliability* 19(2): 287-295 DOI: http://dx.doi.org/10.17531/ein.2017.2.17.

Received 15.02.2017; accepted in revised form 29.04.2017

Scientific Journal of Silesian University of Technology. Series Transport is licensed under a Creative Commons Attribution 4.0 International License