

Identification of University Aviation Education Risks of Military Pilots

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Abstract—The aim of paper is to identify the risks of university aviation education of military pilots at the selected institutions from 1973 to the present using the analysis for the quality teaching process and the interaction of edutants (human factors) teachers and students. The paper is the third part of the study on the above issue of aviation education, which answers the question of the research identification of data. The main motive of our pre-research and historical data analysis is to acquire the knowledge applicable to the creation of new study programs of the Faculty of Aeronautics of the Technical University of Košice (FA) in the study field Transport according to the new descriptions approved by the Accreditation commission. Not everything from the history of aviation education was bad and unusable for the present and the future.

I. INTRODUCTION

According to the goals and requirements for the professional competence, knowledge and skills, we formulate the content of aviation education. The practical implementation of the content of aviation education is reflected in the appropriate methods, forms and didactic means.

The right choice, the optimal use of the potential in the teaching process can highlight and multiply the content of aviation education, which is the subject of transformation between the edutants – human factors in education (teachers and students). On the other hand, the wrong choice, not utilizing the foreground potential, the methods and the didactic means in the teaching process can undermine the educational content, and endanger the attainment of the education and training objectives. For these reasons mentioned above, there is a social need and importance of researching the issue, within the framework of aviation education, as a didactic system in the specific application field of human activity [1].

The subjects of the research are the methods, forms and didactic means of aviation education of military pilots carried out at the institutions since 1973 in

Slovakia until present at the Faculty of Aviation of the Technical University in Košice (FA).

The aim of paper is to identify the risks of university aviation education of military pilots at the selected institutions from 1973 to the present using the analysis for the quality teaching process and the interaction of edutants (human factors) teachers and students.

The research question is which risks of university aviation education of military pilots can we identify on the basis of the historical and content analysis of the study programs of aviation education of military pilots from 1973 within Czechoslovakia, or from 1993 within Slovakia?

II. METHODOLOGY OF PROBLEM SOLVING

The research databases are divided into the years (research periods) 1973-1990, 1990-2004, 2004-2019 and 2019-2025, within the aviation education in Košice.

The method of the data research (identification, analysis and evaluation), comparison, synthesis, induction and deduction will support the formulation of preliminary conclusions of the forthcoming study in this section.

The methodology of problem solving is based on the international standard STN ISO 31000: 2019 Risk Management - Instruction. We used the Delphi's risk assessment technique and Brainstorming assessment technique based on the expert knowledge [2].

III. DISCUSSION AND RESULTS

The final version of the study, which will have a minimum of 5 subchapters within the analytical section, will be part of the internationally created *Expert Database of Civil and Military Aviation Experience* in the fields of:

- Academics subjects,
- Simulation and modelling of Security issues, as in [3-12],
- Technical Sciences, as in [13-18],
- Civil/ Military / Air Force management, education and training etc. as in [19-37].

The result of the study of large amounts of study programs from 1973 to the present, with a prediction up to 2025 are concentrated in the transparent tables for the academic discussion and conclusions.

The backgrounds and limits for the risk assessment: The evaluation and comparison of aviation education content from 1973 to the present was done in the first article of the authors. The evaluation and comparison of the forms, methods and didactic means of aviation education in the years 1973 to the present were carried out in the second article of the authors.

In the third article we have assessed the basic risks of aviation education in the following areas: the Mathematical-physical and theoretical foundations, Basic vocational and transport subjects, Physical preparation, English language, Flight training and aviation-methodological preparation.

TABLE I.
IDENTIFIED RISKS IN MATHEMATICAL-PHYSICAL AND THEORETICAL FOUNDATIONS

Mathematical-physical and theoretical foundations
Identified risks
Reduction of theoretical foundations and mathematical-physical knowledge in the field of higher aviation education from 490 hours of compulsory subjects in the years 1973-1990 to the present time at 253 hours, it means from 20% to 11% percentage of compulsory subjects
Weakening of the knowledge of mathematics and physics to about 1/3 (from 180 hours of mathematics and 120 hours of physics to 55 hours of mathematics and 55 hours of physics)
Reduction of knowledge in the field of Material Science

The interpretation of pre-research results:

Our society “tolerates” a narrowing of the scope and a decrease in the quality of knowledge. The emerging generation, which does not tend to the technical sciences, reduces the study of mathematics and physics as an essential tool for the engineering studies. The historical facts are supported by the experience that this trend has also been introduced into the aerospace education environment, which will have a negative impacts and risks on the aviation and aerospace engineering. The negative impact of the reduction of almost 1/3 hours of mathematics and physics must be stopped and stabilized.

TABLE II.
IDENTIFIED RISKS IN BASIC VOCATIONAL AND TRANSPORT SUBJECTS

Basic vocational and transport subjects
Identified risks
Reduction of Basic vocational and transport subjects in the field of higher aviation education from 1300 hours of compulsory subjects in the years 1990-2004 to the present time at 539 hours in aviation education
“Demilitarization” of higher aviation education of military pilots
Subject transfer of tactics, aircraft armament, air shooting and bombing etc. to the vocational training beyond the higher aviation education

The interpretation of pre-research results:

Our historical data analysis presented that in addition to the math-physical subjects there was also about 50% reduction of general and professional subjects on the transport. The part of professional study is moving into the field of self-study the issue from the available sources. However, this trend requires an adequate self-discipline, strong motivation and above-average study and practical results of new aviation personnel. These assumptions and expectations are the potential risks for the next aviation generation. The specific knowledge of military aviation personnel in the military field is beyond the reach of a civilian university in Slovakia and it creates the potential risks to the scope and quality of knowledge.

TABLE III.
IDENTIFIED RISKS IN THE PHYSICAL PREPARATION

Physical preparation
Identified risks
canceling of the special physical education as a supplement to the general physical education
change of compulsory subject physical education to the compulsory-elective subject in the first 3 semesters and then the change only to the optional subject
abolishing the complex of physical education, special physical education, parachute preparation and shooting preparation of military pilots

The interpretation of pre-research results:

Our society also “tolerates” a reduction in the physical education requirements for the university students, which should be a compulsory elective subject and not just the elective subjects. This negative trend was also confirmed by the facts from our pre-research, which has a negative impact on the removal of special physical training of pilots, etc. This may be a potential risk to the complex psychophysiological resistance of our new aviation personnel.

TABLE IV.
IDENTIFIED RISKS IN THE ENGLISH LANGUAGE PREPARATION

English language preparation
Identified risks
Reduction of general English language preparation in the field of higher aviation education from 500 hours of compulsory subjects in the years 1990-2004 to the present time at 22 hours in aviation education
on different bases of knowledge of future pilots of English language, the Air Communication compulsory subject is realized in the range of 22 hours only
Missing subject of English language for the helicopter pilots as a selective subject

The interpretation of pre-research results:

Knowledge of the English language is a must for the next generation of aircraft. The historical data analysis presented a shift from approximately 500 hours of compulsory language training to approximately 22 hours. The other educational space for the aviation language training is at the level of volunteer and student decision. This creates the potential risks of poor language preparation, the creation of individual errors, misunderstandings in the aviation radio

communications, which can lead to the aviation incidents and disasters.

TABLE V.
IDENTIFIED RISKS IN THE FLIGHT TRAINING AND AVIATION-METHODOLOGICAL PREPARATION

Flight training and aviation-methodological preparation
Identified risks
Reduction of Flight training and aviation-methodological preparation in the field of higher aviation education from 1500 hours of compulsory subjects in the years 1973-1990 to the present time at 1100 hours
the quality of communication and coordination with the university's external partner for the practical flight training
The quality and flight safety in the practical flight training
transfer of practical type training to military aviation technology from university to another entity (training center or air force)
maintaining a balance between the general requirements for pilots and the specific capabilities of military pilots
financial risks of building and maintaining the aviation education infrastructure and didactic means
financial risks of Flight training and aviation-methodological preparation

The interpretation of pre-research results:

Our historical analysis of data within the pre-research has shown a reduction in the compulsory flight training and aeronautical training of future aviation personnel at the university. The efforts to reduce the financial cost of aviation education in the higher education in Slovakia caused the transfer of practical training in the form of a contract with an external institution. This can be a source of potential risks to the quality of aviation education, even a threat to flight safety.

IV. CONCLUSION

The content of paper will be included in the third part of feasibility study on the issue of military pilots' aviation education, which answers the questions of the research for the Ministry of Defence of the Slovak Republic.

The first part of feasibility study was focused on the content of military pilot training as the specific educational agenda. The subject of the research was the content of aviation education of military pilots carried out at the institutions since 1973 in Slovakia until now at the Faculty of Aviation of the Technical University in Košice (FA).

The second part of feasibility study was focused on the examination of the methods, forms and didactic means of aviation education of military pilots at the selected institutions from 1973 to the present using the analysis for the quality teaching process and the interaction of edutants (human factors) teachers and students.

The fourth part of feasibility study will be focused on the exploring the modern areas of aviation education today and their development prospects.

The fifth part of the feasibility study will be focused on the processing of proposals for the prospective training of Sloavk Air Force personnel and the proposals for the preparation of study programs of the Faculty of Aeronautics of the Technical University for

our new accreditation. The study will also include proposals for the personnel, material, technical and financial provision of modern aviation education in Slovakia.

The scientific contribution of the article within the third part of the feasibility study lies in the examination (identification, analysis and evaluation) of historical data from 1959-2019 for the risks of aviation personnel training plans based on the objective and proven facts, without the influence of ideology, the group or individual interests, the future contracts and public procurement to „the selected institutions“, but only for the public interest of the state.

The research database of the study programs of the institutions in Košice, which have been and are currently responsible for the preparation of new military pilots, has allowed us to identify the following risk areas of university aviation education: the mathematical-physical and theoretical foundations, Basic vocational and transport subjects, Physical preparation, English language, Flight training and aviation-methodological preparation.

Each area of university aviation education has identified the basic risks that require our attention to maintain the quality of the teaching process and the interaction of edutants (teachers and students - pilots).

We perceive the university aviation education as a didactic system of aerospace engineering, based on knowledge of applied mathematics and physics, as well as other theoretical foundations for understanding aviation phenomena. Another fall in the range of hours in this area is undesirable.

The basic vocational and transport subjects form the "backbone" of professional knowledge of pilots. The content of aeronautical education must respect international and national aviation practice standards, regulations and requirements. The optimum and efficient use of methods, forms and didactic means must provide the desired content and achieve the desired educational and training goals.

The content of aviation education requires a balance between the preparation of a civil pilot and the future professional career of a military pilot. Otherwise, we run the risk of preparing a "civilian pilot in military uniform" without the appropriate specific capabilities of a real military pilot.

The quality of the activities of a military pilot requires professional physical training, mental fitness and language training in English. The university must be active in the implementation and support of these processes and cannot expect only a "voluntary" fulfillment or free choice of a student-pilot. The risk of physical or psychological pilot failure in the flying is high.

The university can achieve the established educational and training goals in the close cooperation with a state or private partner in the context of aviation education aimed at the creating of competencies, knowledge and skills of future military pilots. Such an example is the cooperation of the Faculty of

Aeronautics of the Technical University in Košice with the Academy of Armed Forces gen. M.R. Stefanik in Liptovsky Mikulas and the Slovak Air Force, or the exemplary partnership cooperation with the training organization Slovak Training Academy, Ltd. in Kosice.

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REFERENCES

- [1] S. Szabo et al. "Proposal of new description of study field No. 6 Transport". Košice: FA TUKE, 2018. 3 p.
- [2] STN ISO 31000: 2019 Risk Management – Instruction. Bratislava: Slovak Office of Standards, Metrology and Testing, 2019.
- [3] P. Fuchs, P. Novak, T. Saska, J. Smida, Z. Dvorak, M. Kelemen, and R. Sousek, "Simulation of dangerous substances outflows into the environment because of traffic accidents by dangerous substances transport", in WMSCI 2010: the 14th world multi-conference on systemics, cybernetics and informatics: proceedings volume 1: June 29th - July 2nd, 2010, Orlando, Florida, USA: International Institute of Informatics and Systemics, 2010, pp. 204-207.
- [4] Z. Dvorak, Z. Cekerevac, M. Kelemen, and R. Sousek, "Enhancing of security on critical accident locations using telematics support", in ICSIT 2010 - International conference on society and information technologies: proceedings April 6th-9th, 2010, Orlando, Florida, USA: International Institute of Informatics and Systemics, 2010, pp. 414-417.
- [5] M. Balatka, P. Fuchs, J. Kamenicky, R. Sousek, and M. Kelemen, "Exposure of the environment and surface water by dangerous liquid - the slop outflow model", in Proceedings Volume III The 15th World Multi-Conference on Systemics, Cybernetics and Informatics July 19th - July 22nd, 2011, Orlando, Florida, USA: International Institute of Informatics and Systemics, 2011, pp. 280-284.
- [6] M. Kelemen, and M. Blišťanová, "Logistic Modelling to handle the Threat of Floods - The Bodva River example", in SGEM 2014: 14th International Multidisciplinary Scientific GeoConference: Conference Proceedings: Volume III: 17-26 June, 2014. Sofia, Bulgaria: STEF92 Technology, 2014, pp. 715-723.
- [7] J. Vágner, and E. Jenčová, "Comparison of Radar Simulator for Air Traffic Control", in Naše more, vol. 61, Issue: 1-2, March 2014, pp. 31-35.
- [8] E. Jenčová, J. Vágner, P. Korba, P. Koščák, and M. Hovanec. "Comparison of the accuracy of selected forecasting methods", Transport Means - Proceedings of the International Conference Volume 2018-October, 2018, 22nd International Scientific on Conference Transport Means 2018; Traskai - Trakai Resort and SPAGedimino str. 26Trakai; Lithuania; 3 October 2018 through 5 October 2018, pp. 1494-14.
- [9] J. Vágner, E. Jenčová, R. Rozenberg, and A. Tobisová, "Optimization of the air traffic services provision on the poprad-tatry airport utilizing the aerodrome flight information services", Vagner J., Jenčová E., Rozenberg R., Tobisová A., Transport Means - Proceedings of the International Conference Volume 2017-September, 2017, 21st International Scientific Conference Transport Means 2017; Rest House "Azuolynas"L. Rezos Str. 54Juodkrante; Lithuania; 20 September 2017 through 22 September 2017, pp. 1035-1039.
- [10] A. Tobisová, R. Rozenberg, J. Vágner, and E. Jenčová, "Social network applicability in air transport", Transport Means - Proceedings of the International Conference Volume 2017-September, 2017, 21st International Scientific Conference Transport Means 2017; Rest House "Azuolynas"L. Rezos Str. 54Juodkrante; Lithuania; 20 September 2017 through 22 September 2017, pp. 1040-1044.
- [11] R. Rozenberg, A. Tobisová, J. Vágner, and L. Melníková, "Conditions of successful cooperation in an aerobic team", Transport Means - Proceedings of the International Conference Volume 2017-September, 2017, 21st International Scientific Conference Transport Means 2017; Rest House "Azuolynas"L. Rezos Str. 54Juodkrante; Lithuania; 20 September 2017 through 22 September 2017, pp. 1045-1049.
- [12] J. Vágner, and M. Ferencová, "The Implementation of Free Route Airspace (FRA) in Slovakia", Magazine of Aviation Development, Vol. 6, no. 4(2018), ISSN1805-7578, p. 22-26.
- [13] H. Pavolová, and A. Tobisová, "The Model of Supplier Quality Management in Transport Company", in Naše more, vol. 60, Issue: 5-6, pp. 123-126. November 2013.
- [14] P. Nečas, and M. Kelemen, "Call for more security: Technology revolution wanted", in ICMT '09: International conference on Military Technologies 2009: 5 to 6 May 2009, Brno. Brno: University of Defence, 2009, pp. 246-250.
- [15] P. Bučka, and M. Kelemen, "Requirements related to the Slovak Republic's Air Force", in ICMT '09: International conference on Military Technologies 2009: 5 to 6 May 2009, Brno. Brno: University of Defence, 2009, pp. 282-289.
- [16] R. Andoga, L. Fozo, J. Judicak, R. Breda, S. Szabo, R. Rozenberg, and M. Dzunda, "Intelligent Situational Control of Small Turbojet Engines", in INTERNATIONAL JOURNAL OF AEROSPACE ENGINEERING, Hindawi, Vol. 2018, Jun 2018, pp.16.
- [17] R. Rozenberg, V. Socha, L. Socha, S. Szabo, and V. Nemeč, "Critical elements in piloting techniques in aerobatic teams", in 2016 Transport Means - Proceedings of the International Conference, Kaunas, Lithuania: Kaunas University, pp. 444-449.
- [18] S. Ďurčo, J. Sabo, R. Rozenberg, and Ž. Miženková, "Means of CPDLC using with ATC procedures in terminal maneuvering area", in 2017 Distance Learning, Simulation and Communication 2017. Brno: University of Defence, 2017, pp. 62-67.
- [19] P. Nečas, M. Kelemen, and M. Sopóci, "Information operations and media: Beyond the Security Scope?", in 15th International Conference the Knowledge-based Organization: Military Sciences. Security and Defence, Conference Proceedings I, Nicolae Balcescu Land Forces Academy, Nov 26-28, 2009, Sibiu, Romania: Nicolae Balcescu Land Forces Academy, 2009, pp. 96-103.
- [20] P. Kaľavský, V. Socha, L. Socha, P. Kutílek, J. Gazda, and M. Kimličková, "Conditions for Abandonment Out of a Helicopter Using Personal Rescue Parachute", in International Conference on Military Technologies Location: OPROX, Inc., Brno, Czech Republic May 19-21, 2015, Faculty of Military Technology, the University of Defence in Brno; Czechoslovakia Section of IEEE; OPROX, Inc. Book Series: International conference on military technologies. Brno: University of Defence, 2015, pp. 467-471
- [21] M. Sopóci, M. Kelemen, and P. Nečas, "Military Management in 21 century and Transformation of Army", in 15th International Conference the Knowledge-based Organization: Military Sciences. Security and Defence, Conference Proceedings I, Nicolae Balcescu Land Forces Academy, Nov 26-28, 2009, Sibiu, Romania: Nicolae Balcescu Land Forces Academy, 2009, pp. 138-142.
- [22] M. Kelemen, S. Szabo, and I. Vajdová, "Cybersecurity in the Context of Criminal Law Protection of the State Security and Sectors of Critical Infrastructure", CNDCGS 2018 International Scientific Conference, 25.04.2018-27.04.2018, Litva. SIGN-TUKE 197361 // Challenges to national defence in contemporary geopolitical situation: proceedings / Bekesiene, S. (editor) ; Hošková-Mayerová, Šárka (editor). - Vilnius (Litva) : The General Jonas Žemaitis Military Academy, 2018. - ISSN (online) 2538-8959. pp. 100-104.
- [23] M. Kelemen, J. Drotárová, D. Kačíková, and M. Bodor, "Percepton of security and safety need: voluntery fire protection as a part of volunteering on Slovak

- Republic“, *Journal of Security and Sustainability Issues* 5(4): 589-599. [https://doi.org/10.9770/jssi.2016.5.4\(11\)](https://doi.org/10.9770/jssi.2016.5.4(11))
- [24] M. Kelemen, S. Szabo, and I. Vajdová, “Security Management in the Air Transport: Example of an Interdisciplinary Investigation of Special Security Questions”, CNDCGS 2018 International Scientific Conference, 25.04.2018-27.04.2018, Litva, Challenges to national defence in contemporary geopolitical situation: proceedings / Bekesiene, S. (editor) ; Hoškova-Mayerová, Šárka (editor). - Vilnius (Litva) : The General Jonas Žemaitis Military Academy, 2018. - ISSN (online) 2538-8959. pp.105-108.
- [25] M. Kelemen, and J. Jevčák, “Security Management Education and Training of Critical Infrastructure Sectors' Experts”, in the New Trends in Aviation Development NTAD 2018: The 13th International Scientific Conference, Proceedings, 28 November 2018 / Rudolf Andoga. (ed.) - Danvers (USA) : Institute of Electrical and Electronics Engineers, 2018. - ISBN 978-1-5386-7917-3. pp. 68-71. DOI: [10.1109/NTAD.2018.8551687](https://doi.org/10.1109/NTAD.2018.8551687)
- [26] V. Polishchuk, and M. Kelemen, “Information Model of Evaluation and Output Rating of Start-up Projects Development Teams”, in Luengo, D. et al. (ed.) Proceedings of the Second International Workshop on Computer Modeling and Intelligent Systems (CMIS-2019), Zaporizhzhia, Ukraine, April 15-19, 2019. CEUR Workshop Proceedings Vol. 2353, CEUR-WS.org 2019, pp. 674-688.
- [27] M. Kelemen, “Security of the Slovak Republic and issues of protected interests: Security and criminal law research topics”, in: *Fire protection, Safety and Security 2017. International Scientific Conference Proceedings*, May 3rd. – 5th., 2017, Zvolen, Slovak Republic. Editors Majlingová, A, Veľková, V. Zvolen: Technical university, 2017. ISBN 978-80-228-2957-1. pp. 312-316.
- [28] J. Drotárová, D. Kačíková, M. Kelemen, and M. Bodor, “The possibilities of using blended learning in fire safety education”, in: CBU international conference proceedings 2016: innovations in science and education: March 23-25, in Prague, Czech Republic. Vol. 4 ; eds. Tavleen Sahota, Mary-Anne Jones. - ISBN 978-80-88042-05-1. - ISSN [1805-997X](https://doi.org/10.1109/NTAD.2018.8551687). pp. 283-286.
- [29] V. Polishchuk, M. Kelemen, and J. Kozuba, „Technology Improving Safety of Crowdfunding Platforms Functioning in the Context of the Protection of the Start-Up Investors in the Financial and Transport Sectors“, *Journal of Konbin*, Vol. 49 no. 1(2019), pp. 313-330, 2019 /2083-4608/
- [30] M. Kelemen, M. Pilát, S. Makó, R. Rozenberg, and A. Tobisová. “Pricing Policy Aspects in Competitive Fight Between Low-Cost Airlines on Kosice Airport”, *Journal of Konbin*, Vol. 49, no. 1(2019), pp. 331-342.
- [31] R. Urban, M. Štroner, P. Blistan, L. Kovanič, M. Patera, S. Jacko, I. Ďuriška, M. Kelemen, and S. Szabo, „The Suitability of UAS for Mass Movement Monitoring Caused by Torrential Rainfall - A Study on the Talus Cones in the Alpine Terrain in High Tatras, Slovakia“. *ISPRS Int. J. Geo-Inf.* 2019, 8, 317. doi:10.3390/ijgi8080317
- [32] S. Szabo, S. Makó, A. Tobisová, P. Hanák, and M. Pilát, „Effect of the load factor on the ticket price“, *Problemy Transportu = Transport Problems : International Scientific Journal*. Gliwice (Poľsko): Politechnika Slaska Roč. 13, č. 3 (2018), pp. 39-47. Available online: http://transportproblems.polsl.pl/Archiwum/2018/zeszyt3/2018t13z3_04.pdf...
- [33] P. Kaľavský, R. Rozenberg, P. Petříček, L. Socha and V. Socha, “Helicopter emergency medical services response time in the Central European Region”, in New Trends in Aviation Development 2018: The 13. International Scientific Conference. - Danvers (USA): Institute of Electrical and Electronics Engineers, pp. 64-67.
- [34] P. Kaľavský, R. Rozenberg, B. Mikula and Z. Zgodavová, “Pilots' performance in changing from analogue to glass cockpits”, in Transport Means 2018. Part III: proceedings of 22nd International Scientific Conference. - Kaunas (Litva): Kaunas University of technology, pp. 1104-1109.
- [35] M. Dzunda, N. Kotianova, P. Pulis, et al.: *Selected Aspects of the Windmill Construction Impact on Air Traffic Safety*. Conference: International Conference on Power, Energy Engineering and Management (PEEM) Location: Bangkok, THAILAND Date: JAN 24-25, 2016, Pages: 290-294
- [36] M. Dzunda, P. Dzurovcin, D. Cekanova: *Operational economic aspects of warning collision systems for helicopters*. Transport Means - Proceedings of the International Conference 2018-October, pp. 1151-1155
- [37] M. Dzunda, N. Kotianova: *Selected Aspects of Applying Communication Technology to Air Transportation*. Conference: International Conference on Computer Science and Information Engineering (CSIE) Location: Bangkok, THAILAND Date: JUN 28-29, 2015, Pages: 1-7

Risk and opportunities in the process of flight delay

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Abstract – Flight delays represent a common problem in everyday air traffic practise. The impact of flight delay can be a risk and this risk represents financial losses, the dissatisfaction of passengers, time losses, loss of reputation and bad business relations. If an airline doesn't deal with this problem immediately, it will cause other problems. The main goal is to solve this situation to ensure the continuity of air traffic. The most important is to identify the reason, that causes the flight delay. It can be technical reasons, such as aircraft damages, failures or operational reasons. An operational problem may be, for example, human factor failure, mismanagement or the process organization. There are many ways how to identify problems. One of the possibilities how to solve the problem and eliminate it is to usage process management and risk management. The paper will aim to describe a methodology based on risk management that will help identify problems that cause the flight delay.

I. INTRODUCTION

Flight delay is an operational irregularity and represents a problem in the air traffic. Airlines should respond to the problem quickly and efficiently to ensure the satisfaction of all stakeholders. The reasons that can cause the flight delay are various. These reasons also represent risks and it is necessary to review all technical, organizational, human and environmental aspects. Same as financial, economic, legal and other aspects that have a negative impact on the safety and continuity of the air traffic process. Before we begin to assess risks, it is necessary to understand the whole process of flight delay. We use process management and risk management. Process management helps up with understanding and working with problem and risk management is use for risk assesment.

Several authors have dealt with the air traffic, air navigation, communication and the other aspects (aviation, safe airspace) which can cause the flight delays, and as an example, the issue was mentioned in this topic Mitigating Air Delay: An analysis of the Collaborative Trajectory Options Program where authors said that Congestion is a problem at major airports in the world. Airports tend to be the bottleneck in the air traffic control system. The problem that arises for the air planner is how to mitigate air congestion and its consequent delay, which causes increased cost for airlines and discomfort for passengers [1]. The air

transport market is beginning to evolve rapidly thus bringing organizational changes for individual airports and air carriers [3]. In the presented article we discuss the operational economic aspects of detection and anti-collision systems [7]. The paper is dealing with the selected stages of Ultra-Wide Band (UWB) radar signal processing. To this purpose, it provides the definition of UWB and describes some of the phases of the UWB radar signal processing [14]. The submitted contribution analyses the principles underlying the operation of passive surveillance systems also presenting potentials of their use in air transportation. It focuses on their advantages compared to primary radars and the possibilities of integrating passive surveillance systems into operational systems of air transportation [4]. The contribution is a treatise on the potentials of applying communication technology when determining the position of a flying object in a system of relative navigation. It provides algorithms for computing the position of a flying object in a space. [10]. The article focuses on the problems of windmill construction impact on air traffic safety. We present the methodology for assessment of the windmill construction impact on the aviation electronic system operation and safety [11]. There are the relationship between the total size of an airline and its flight delays. Total size of an airline is measured by its total market share, total amount of assets and also total number of full-time equivalent employees [9]. The number of transported passengers as one of the most basic airport operation services is dealt with scheduled and non scheduled passenger transport for the chosen year [6]. The factor of the aircraft load or the load factor is the rate of capacity of the airline. It is the efficiency measure and is used estimate to describe the performance of the airline. The high load factor is important for the profitability of the airline, and it is interesting to identify factors that could influence the factors of the aircraft load [8]. Flight delays, causing much disorder of air traffics, economic losses of airlines, and downgrading the travel quality of millions of people in airports all over the world [5]. Predicting the flight departure delay can be the main input for the prediction of the flight arrival delay. Based on using the new dynamic reserve crew strategy, the total crew cost can be reduced. This significantly benefits airlines in flight schedule stability and cost saving in the