

ZRÍNYI MIKLÓS  
NATIONAL DEFENSE UNIVERSITY  
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Author's introduction and official critique of the Ph. D. dissertation by  
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**DISASTER MANAGEMENT AND  
FIRE PROTECTION OF AIRPORTS**

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# I

## SUMMARY OF THE RESEARCH ACTIVITIES

After the destruction of the towers of the World Trade Center on 11 September 2001 and the terrorist threats and attacks in the following period air traffic security requirements radically changed. At airports, the security check of both the passengers and luggage became tighter, and the level of availability of services ensuring flight safety and security significantly rose. Due to the upgrade of regional airports in Hungary and to the above facts it is of utmost importance that organizations establishing and servicing airports and ensuring their fire protection have a uniform documentation that, using Hungarian and international specialized literature and experiences, could provide assistance in the designing, construction and operational periods.

### **1. Objectives of the dissertation**

- Assessment of air traffic, flying and airport security, the determination of a uniform safety philosophy thereof that is valid at present, and the demonstration of the relation between its elements.
- Study of the principles relating to the establishment and operation of airport fire brigades, and the ascertainment of the necessary changes.
- Demonstration of the results of the survey of the training and the physical and psychological capabilities of airport fire brigades, carried out during my previous assignment, and the ascertainment of procedures relating to the principles of tactical intervention.

### **2. In order to achieve the objectives**

- I have studied the Hungarian and foreign specialized literature and materials and the legal and technical publications of ICAO, relating to my topic.
- I have used the relevant materials of ICAO documentations and the effective standards, procedures and recommendations of the Annexes.
- I have had consultations with Hungarian and international aviation and disaster management experts.
- I have participated in study tours in the neighboring countries during which I had insight into the regulations relating to the national procedures applied.
- Using my experiences of several decades spent in this field, studying foreign specialized literature and using the experiences of airport fire station construction

under my supervision I provide a summary of issues concerning the establishment and operation of airport fire brigades, examination and training of the personnel and tactical intervention, that has never been systemized before in Hungary.

### **3. Research methods**

- In order to achieve the research objectives I have applied general and specific methods together during the elaboration of the topic. I have used, from the general research methods, observation and critical adaptation, and from the special methods I have integrated my adaptable experiences gained during emergency and air search and rescue exercises.
- When compiling the dissertation I have used the comments and recommendations I had received as a feedback from my publications or presentations at conferences or during workplace discussions.

### **4. Practical benefit of the dissertation**

- It can serve as a basis for the determination and elaboration of the uniform safety philosophy of designing airports.
- It can contribute to the approximation and actualization of international laws in the Hungarian system.
- It can provide help for the cooperation between the operators and security services of airports and the airlines.
- It can give a guideline in the field of establishing and operating airport fire brigades and in the issues of tactical interventions.
- It can promote my future research activity.

## **II**

### **SUMMARY OF THE SCIENTIFIC RESEARCH ACTIVITIES**

My dissertation consists of a short introductory, four chapters and the summary of the research activities.

**In the introductory**, I have highlighted the reasons encouraging me in writing the dissertation. I have ascertained the goals for which I have carried out my research activities. I

have summarized the research activities. I have made recommendations for the practical utilization of my work.

**In Chapter I**, I have briefly summarized the major events in the history of air traffic. I have characterized the elements of air traffic; I have drafted its main means and processes. I have scrutinized the safety of airports, as an important and decisive element of air traffic, and I have ascertained its uniform safety philosophy and demonstrated the interrelation between its elements.

At the end of the chapter, I have drawn conclusions and ascertained that:

- The ground servicing of aircraft takes place at airports, which, besides its “railway station” activities, it ensures the infrastructure needed for the operation of aircraft, together with its risks. Ground service activity is even more complicated by the considerable amount of cargo traffic at airports, during which hazardous materials, dangerous for human beings, are also present.
- Based on the right to live in safety and to have safe living conditions, stipulated by the Constitution, safety of passengers must be guaranteed at airports as a kind of materialized service.
- In the framework of law enforcement services, safety and security, provided by fire brigades and disaster management organs, also represent economic values. The safety and security of air traffic is a perception of individuals and nations, relating to operational stability of flying and airports, which is nothing else than an undisturbed status free of dangers and troubles, created by legal means. When improving or upgrading airports their effects on one another have to be studied in a complex way, because otherwise, if any of them is more advanced, it will lead to the induction of capacity, thereby the risk of unsafe operation will increase.
- The improvement of fire protection and disaster management procedures will provide the operator the possibility to increase the amount of air traffic.

**In Chapter II**, I have demonstrated the establishment and operation of an average airport in the light of the requirements through the example of the Budapest International Airport.

At the end of the chapter, I have drawn conclusions and ascertained that:

- Budapest Ferihegy International Airport is a Central European airport with an average amount of traffic. Its constructional design and fire safety system meets the requirements of a modern airport. Since there are no hydrants along the runways, reservoirs or other water access points have to be established to be able to extinguish aircraft fires. From economical aspects it is advised to increase the amount of

extinguishing material kept on wheels instead of establishing a stationary water cistern. It can beneficially influence the airport's fire safety categorization besides ensuring the necessary amount of water and foam forming material.

- During the reconstruction of Terminal I a special attention should be paid also from a fire safety aspect, since - due to its historic monument character - the flammable internal wooden cover has to be preserved in its original form. Therefore, other additional solutions will have to be introduced in order to increase fire safety.
- The double runway design of the airport, its geopolitical situation and status, and the existing up-to-date buildings and the possibility of further improvements all entail the airport's further increase of traffic.

**In Chapter III**, I have analyzed the major responsibilities of fire protection and disaster management of airports based on ANNEX 14 of ICAO, which actually sets an international framework for the fire protection and disaster management of categorized airports as a kind of standard. In connection with aircraft accidents and other incidents I have surveyed the specific activities of airport fire brigades, I have examined the technical, personnel and material conditions of intervention, and I have determined their necessary level. I have touched upon the physical and psychological screening and training of the personnel of the Airport Disaster Management Directorate.

At the end of the chapter, I have drawn conclusions and ascertained that:

- In the case of an aircraft accident the rescue and safety of trapped passengers is of primary importance. All other activities have to be subordinated to this action. The features of aircraft fires – based on characteristics of the materials used and built in – are that they can become very devastating in a very short time. Due to this feature strict requirements have to be implied when organizing and executing rescue operations.
- In this chapter I have determined the principles relating to the theoretical and critical fields, and the principles of categorization of an airport.
- Based on calculations and practical examples I have demonstrated the method of calculating the amount of extinguishing material necessary.
- For the sake of starting life rescue operations as soon as possible the service personnel of an airport have to meet strict time normatives, which, depending on the design and geographical situation of the airport, requires the operation of a stand-by fire detachment post.
- In order that the personnel carry out their tasks on an acceptable level they must be in a suitable physical and psychological status, which I have highlighted in connection

with the screening of the personnel of the Airport Disaster Management Directorate under my leadership. In order to ensure the required level of tactical intervention the continuous theoretical and practical training of the personnel and keeping it on the required level and testing it are of primary significance.

- The cooperation of response organizations requires the availability and operation of suitable communication channels. I have demonstrated the protection level to be ensured using several examples, due to its complexity.
- When determining the requirements the availability and storage of extinguishing materials or the establishment of fire stations for the comfort of personnel are factors not to be neglected.

**In Chapter IV** I have dealt with the intervention rules of airport fire brigades. I have analyzed the planning activities and drills thereof. I have reviewed aircraft emergencies, the practical activities thereof when they occur, also the rescue tactics and equipment used, the procedures of aircraft personnel, the post-accident activities and the tasks to be drilled during training.

At the end of the chapter, I have drawn conclusions and ascertained that

- In order to manage aircraft emergencies airports need emergency plans that contain all the information necessary for the response. Competences and authorizations have to be unambiguously determined and separated to ensure the flawless response to emergencies.
- Assembly areas, meeting points and other strategic areas have to be designated in the plan. In order to ensure a uniform interpretation it is advised to make a grid map of the airport.
- External units arriving to grant assistance should possess basic information on the features of the airport. It can be accomplished by conducting exercises for them.
- I have determined the tactical principles to be used during interventions and the arrangement procedures to be followed.
- I have analyzed the methods and principles used during specific fires (fuel leakage, landing gear fires, etc.). I have made special point on the extinguishing of fires of magnesium and its alloys, regularly found in aircraft components. I have determined the ideal number of personnel in a rescue team and the suitable methods of their intervention.
- I have paid utmost attention to the methods of removal of products of combustion, and ventilation and providing fresh air, vital from the aspect of the lives of passengers. I

have emphasized the establishment of coordination and responsibilities of organizations participating in rescue operations.

- Rescue of persons has to be executed through the emergency chute-slides of aircraft if there are no other hindering factors.
- I have recommended methods for carrying out post-accident procedures and preserving and reconstructing traces and evidences in relation to the accident.

### **III**

#### **SUMMARY OF SCIENTIFIC ACHIEVEMENTS**

Bearing in mind Hungary's accession to the European Union and the events of 11 September 2001 in the USA regulations relating to the protection of airports have become stricter in the area of civil aviation. In Hungary, no specialized or comprehensive literature has been published so far on the protection to be provided by the fire service. In my dissertation I have comprehended the several decades of service experiences and recommendations I had gained and accumulated as the chief fire officer of the airport and as member of the CTIF Airport Committee.

In order to accomplish my research goals I have used the methods of general and specific research: observation, induction and critical adaptation, the experiences gained during education and implementation; from the special research methods I have applied the methods of analysis and elaboration of disaster management achievements, the use, the command and control and the command exercises of the personnel and equipment of the Airport Disaster Management Directorate and of its legal predecessor, the Airport Fire Brigade Headquarters.

In order to achieve my research objectives I have studied Hungarian and foreign specialized literature and research achievements in connection with my topic. I have elaborated Hungarian and international specialized materials relating to the European integration and the operation of airport fire brigades. I have led consultations with the representatives of this specific area working at central and regional bodies; I have utilized my experiences gained during academic and practical education. I have participated in conferences organized by various scientific workshops and I have used the information gained there.

The aim of my Ph. D. dissertation is to systemize and unify the several years of experiences gained in the field fire protection and disaster management of airports in Hungary and abroad, and to promote a more expedient kind of leadership, enhance the planned, organized and efficient use of personnel and equipment, the uniform interpretation of airport disaster management knowledge, and to provide new information for the persons working in this field. It should fill in

the gap in and make up for the lack of knowledge and teaching materials. Its use should help manage the expected or unexpected incidents and perform tasks in a more efficient way.

Life proves that the participation of cooperating organs during the elimination of damages and/or fires is inevitable in the performance of protection efforts because own personnel and equipment available are insufficient in many cases, therefore it is necessary to coordinate the activities of all organizations affected.

- 1) In my dissertation, after reviewing the basic concepts, I have analyzed the notion of safety/security and its interrelation with civil aviation. Based on international and Hungarian regulations I have ascertained principles concerning the safety and security rules and regulations of establishing and operating airports. For the sake of practical understanding I have reflected the issues of fire protection of the most important airport facilities using the Budapest International Airport as an example.
- 2) I have elaborated the principles relating to the accommodation of rescue and fire personnel and vehicles and training. I have emphasized the categorization of an airport and the method of calculating the amount of extinguishing material stored “on wheels”.
- 3) I have paid utmost attention to the conduct and the results of the physical and psychological screening, unique in Hungary, started with my professional supervision at the Airport Disaster Management Directorate. I have ascertained recommendations relating to emergency planning.

There have been several regional initiatives in Hungary lately by major towns to establish and run airports. I assume that the material compiled by me will grant enormous assistance both in relation to establishing and operating airports.

I have not yet finished my research activities by this. I intend to carry on my scientific work in the field of airport disaster management, putting a special emphasis on the further improvement of the theory, on the use of personnel and equipment and on the issues of leadership and cooperation.

### **Scientific achievements**

1. I have determined the modern interpretation of air traffic safety, as a perception of individuals and nations, relating to operational stability of flying and airports, which is nothing else than an undisturbed status, free of dangers and troubles and created by legal means.
2. I have determined that the safety/security systems of airports may only be improved in a parallel way, because otherwise, if any of them is more advanced, it will induce the capacity, thereby the risk of unsafe operation will increase.



3. As a summary of my research activities in Hungary and abroad, and experiences gained during the several decades spent in the specific field I have systemized the specialized literature concerning the planning and operation of airport fire brigades and interventions during emergencies, its adaptation and publication for use in Hungary.

### **Recommendations**

- a., The implementation of EU law approximation as soon as possible.
- b., The enforcement of fire service, establishment and operation principles ascertained in my dissertation during the implementation of initiatives relating to establishment and operation of airports by major towns in Hungary.
- c., In order to manage the fire protection and disaster management issues of airports in Hungary in a uniform way the Airport Disaster Management Directorate, having accumulated a significant amount of specialized experience, should be appointed to act as a specialized authority and control organization, based on legal authorization.

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## LIST OF PUBLICATIONS

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2. Veszélyes anyagok előállítása, felhasználása és tárolása. (Védelem 2001/2. szám)
3. Veszélyes anyagok szállítása. (Védelem 2001/4. szám)
4. Veszélyelemző módszerek általános áttekintése. (Katasztrófavédelmi Szemle VI. évf. 2. szám)
5. A súlyos ipari balesetek általi veszélyeztetettséggel kapcsolatos értékelési eljárások. (Katasztrófavédelmi Szemle VI. évf. 2. szám)
6. Éghető porokkal terített helyiségek tűz- és robbanásveszélyességének értékelése. (A katasztrófák és keletkezésük előrejelzésének problémái. 2001. VI. 26-27. Moszkva)
7. Repülőterek tűz- és katasztrófavédelme. (Repüléstudományi Közlemények Különszám 1. 2001.)
8. Repülőterek tűz- és katasztrófavédelme a Ferihegyi repülőtér tükrében. (Katasztrófavédelmi Magiszter 1. szám, 2001.)
9. A megelőzési-hatósági tevékenység fejlesztése. (Védelem 2001/2. szám)
10. Feladatok és hatáskörök a veszélyes anyagok balesetei elleni védekezésben. (Védelem 2002/1. szám)
11. Gyakorlati katasztrófavédelem. (Védelem 2002/1. szám)
12. A SEVESO II. Irányelv hatósági szervezeti rendszere. (Védelem 2002/1. szám)
13. A SEVESO II. Irányelv bevezetésének feladatai. (Védelem 2002/2. szám)
14. SEVESO II. Irányelv kockázatelemzési módszerei. (Fire Prevention 2002.)
15. A SEVESO II. Irányelv értékelése. Határidők határán. (Katasztrófavédelem 2002. 11. szám)
16. Katasztrófavédelem az EU-csatlakozás tükrében. (Belügyi Szemle 2003/4. szám)
17. Az EU-csatlakozás és a katasztrófavédelem. (Katasztrófavédelem 2003/3. szám)
18. Időszerű feladatok a katasztrófavédelemben az EU-csatlakozás küszöbén. (Katasztrófavédelem 2003/7. szám)

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