Determination of the Minimum Amount of Financial Costs in the Event of Occurrence of Selected Crisis Situations Caused by Passengers at the Airport

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Abstract

Aircraft accidents are currently a relatively common phenomenon. They are the most distressed situations in civil aviation, critical not only for the general public, but also for air transport operators and airports. Every crisis situation has different impacts on the airport, whether material or financially. The aim of this contribution is to analyze the course and impact of selected crisis situations, including unlawful interference, deterioration of passenger's health on an aircraft board and crowd psychosis, and then quantify the minimum amount of financial costs that arise in these crises. The calculation of these costs is particularly important for airports and their effective preparation for the possible occurrence of individual crisis situations. This raises the question of whether airports are prepared for the possible occurrence of crisis situations and whether they create at least a minimum financial margin to eliminate the impact of each crisis situation.

Keywords

crisis, crisis situation, air accident, financial analysis

1. Introduction

Aircraft accidents are currently a relatively common phenomenon. They are the most distressed situations in civil aviation, critical not only for the general public, but also for air transport operators and airports. Any person involved in an accident should deal with this situation. The responsible airport authorities dealing with critical situations when such a situation occurs, but also in a period without it, must be prepared to deal with all situations whether they are human activity crises or, in particular,

crises caused by natural disasters. To ensure that all civil aviation authorities for crises co-ordinate and cope with civilian aviation crises effectively, a civil aviation crisis commission has been set up to approve crisis plans for security. The airport must therefore be prepared to solve not only for a crisis plan, but also some possible financial losses.

There are many studies that deal with crisis situations at airports, whether due to terrorism or air accidents. None of the studies, however, does not address the financial implications and costs of the various crisis situations at the airport.

Previous studies (Yan & Lin, 1997; Government of Canada, 2002; Rupp, Holmes, & DeSimone, 2003; Balvanyos & Lave, 2005; Gordon, Moore II, Park, & Richardson, 2007) have produced estimates of the economic implications of terrorism on commercial aviation and the cost of a shutdown for a specific stakeholder. Pejovic, Noland, Williams and Toumi (2009) simulated and assessed the effects of a short-term shutdown at London-Heathrow for some stakeholders (airlines and passengers). Maertens (2012) used this research to assess more in depth the interruption losses of a shutdown for the airport and airlines. Therefore, the objectives of this research are to determine all economic effects and costs of a temporary shutdown of an airport for different stakeholders, and this both in the short and long run.

Another study (De Langhe, Struyf, Sys, Van de Voorde, & Vanelslander, 2013) determine all economic effects and costs of a temporary shutdown of an airport for different stakeholders, and this both in the short and long run.

The cost of providing security in airports, especially in facilitating passenger throughput, has risen despite efforts to upgrade training and technology. The classic measure of passenger throughput assumes passengers are passive cogs in a carefully designed security matrix to optimize output. This perspective does not take into account passenger behavior (Kirschenbaum, 2013).

The term "extraordinary event" refers to all events of which threatening of the human life and material damages are accompanying features. Air terminology (ICAO Annex 17) distinguishes between eight types of extra ordinary events:

- ground aircraft crash,
- an air accident outside the area of the airport,
- natural disaster,
- act of unlawful interference,
- deterioration of the passenger's health on the aircraft board,
- ecological accident,
- an operating crash at an airport,
- crowd psychosis.

2. Method

For determining the amount of financial costs incurred by airports in individual crisis situations it was necessary to obtain detailed information on the different types of crisis situations associated with air transport. The methodology for determining the level of the minimum financial costs of each crisis situation is shown in Figure 1.
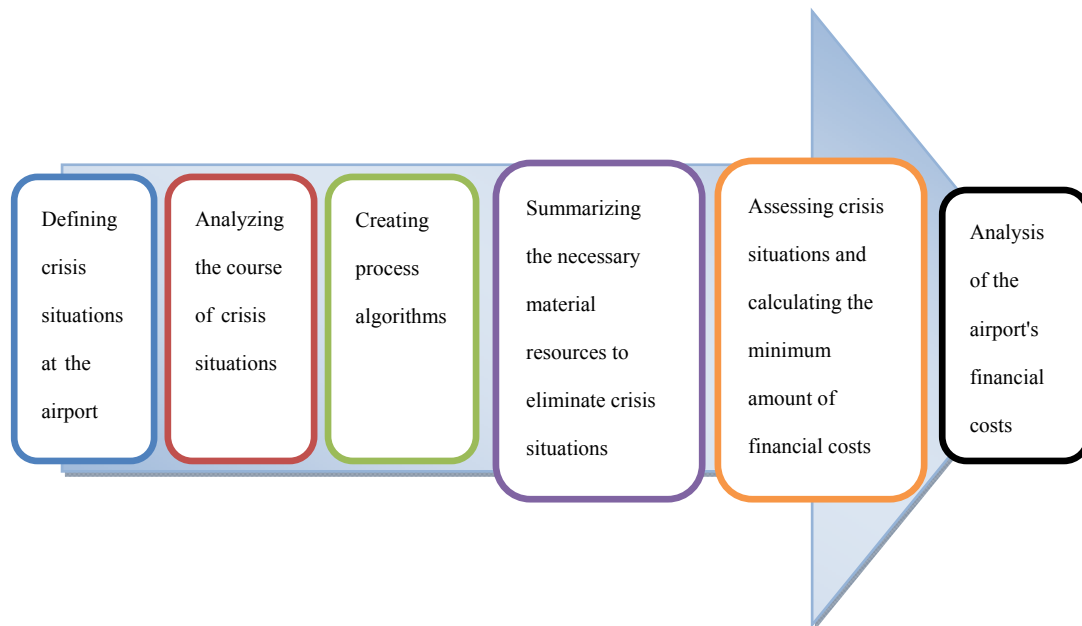
Figure 1. Methodology

The individual crisis situations have been analyzed from the point of view of their anticipation, course and impact. Based on the analysis and emergency plan of the airport, algorithms have been developed to show the basic interaction of the individual rescue and security components that are involved and cooperate in solving the given crisis situation. The algorithms also show the hierarchy of the co-operating components.

The Emergency Plan ensures the coordination of all airport departments, including their responsibilities, which are involved in dealing with emergencies, the main purpose of which is to minimize all consequences of extraordinary events. The Emergency Plan is developed on the basis of an airport needs. Its job is to manage the crisis situations arising within its scope.

Bodies that provide security protection are involved in recognizing and resolving any crises in civil aviation (Emergency plan of Kosice Airport, n.d.; Vagner & Pappová, 2013), in particular:

•   Ministry of Transport, Construction and Regional Development,

•   Ministry of Interior,

•   Department of Defence,

•   Finance Ministry,

127

- State administration authorities in their area of responsibility,

- Police force,

- Airport operator,

- Airfield operator,

- Airline operator,

- Air traffic service provider.

For the needs of an analysis in terms of content intensity, the article discusses selected crisis situations, including unlawful interference, deterioration of passenger's health on an aircraft board and crowd psychosis, which are also categorically similar. The aforementioned extraordinary events also created a simulated situation at the airport to point out the impact of such an extraordinary event on the airport financial costs. As a prerequisite for the realization of the simulated extraordinary event, the conditions of the international airport—Kosice Airport, as were chosen, while the simulation of the crisis situation was based on the organizational arrangement of this airport. The simulation is also applicable to an airport of a similar type and character. These analyzes aimed to find answers to several questions:

1) What is the minimum amount of financial costs that airports are forced to spend to eliminate the emerging crisis situations?

2) Are the airports creating a reserve fund, where they would like to have a financial reserve in the event of a crisis situation? If so, in what amount airports create this fund?

Determining the minimum amount of financial cost for the selected crisis assumes the use of one or the minimum amount of any means necessary to eliminate the crisis. Individual data were aggregated and interpreted in the form of final analyzes. For the purposes of this article, we report the results in summary tables with resulting data on individual financial costs in each crisis situation.

3. Results

3.1 Acts of Unlawful Interference

Acts of unlawful interference are defined as acts or attempted acts that threaten the safety of civil aviation and air transport, such as:

- violence against a person on an airplane board, if such an action may endanger the safety of the flight;

- intentional destruction of the operating aircraft or deliberate damage to the operating aircraft as a result of which the flight safety may not be flown or jeopardized;

- locating or assisting in placement of equipment or material on an aircraft that could destroy or damage the aircraft so that it will not be able to fly or be at risk of flight safety;

- intentional destruction or deliberate damage to navigational aids or interruption of their activities if such an operation may endanger the safety of the aircraft;

- notifying information that is knowingly falsified to jeopardize or can jeopardize the safety of the aircraft;

128

•   unlawful and intentional use of equipment, material or weapons to commit violence against a person at an airport serving civil aviation that causes or can cause serious injury or death;

•   unlawful and intentional use of equipment, material or weapons to destroy or seriously damage aerodrome equipment serving civil aviation or an aircraft currently unused at the airport, or disruption of services, if such an act endangers or threatens to endanger the security at the airport (Zalai, 2010).

The design diagram for the act of unlawful interference is shown in Figure 2. It shows the sequence of involvement of the individual components in the process of elimination of an extraordinary event from its origin to its resolution.
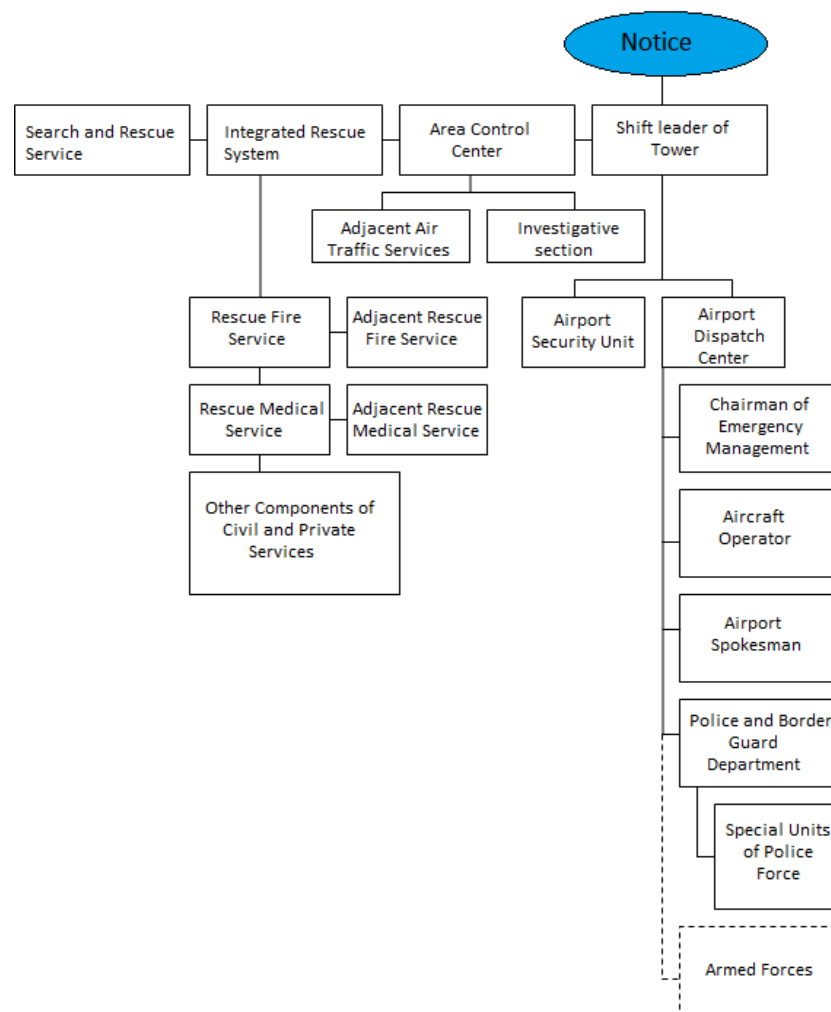
Figure 2. Aircraft Accident

If there is an act of unlawful interference at the airport, the costs necessary for elimination of this extraordinary event will depend on the performance of rescue teams not only located directly at the airport but also on other specialized components.

The costs of the fire service to be activated in the event of an act of unlawful interference is calculated

on the basis of the consumption of extinguishing agents, instruments, tools and fuel consumption. In this type of extraordinary event, it must be taken into account that there may also be a fire.

The most basic extinguishing agent is a foam component that is mixed in water at a rate of 3 liters of foam per 100 liters of water. The fire truck has a tank that pumps up to 8, 5 liters of water on average. This volume of water requires 255 liters of foam. According to the current pricelist, a liter of foam costs about 5 EUR. Therefore, the total cost of fire extinguishers needed for one firefighting vehicle may range from 1,280 EUR.

The cost of fire extinguishers that serve to eliminate smaller fires is 30 EUR per unit. The price of firefighting tools used for unwrapping, extinguishing, fire damping and punching is around 100 EUR per item.

Approximate fuel consumption of the fire truck is 50 liters per 100 kilometers. The total cost of fuel consumption, using a fire truck, may be about 70 EUR.

Together with the fire brigade also a rescue service is called to provide emergency medical assistance if needed. If the airport does not have an outpatient facility in its area, the injured people are concentrated in the medical points. From there, they receive a call for quick medical help. The price for a quick medical assistance is around 50 EUR and the cost per kilometer is 0.79 EUR.

In the event of an emergency such as an act of unlawful interference, it is very important to evacuate both passengers and airport staff. The alternate transport by bus for approximately 50 passengers ranges from 200 EUR.

Counting the work of other components of private services or civil service departments depends on the nature of the extraordinary situation. Examples of private services include, for example, a funeral service or a security service. An example of the state administration component is the Police Corps which deals with the search for bombs at the airport.

Table 1 shows the approximate amount of performances of individual components in the event of an act of unlawful interference, which, after counting all items, is equals 1, 750 EUR.

Table 1. Financial Analysis of the Act of Unlawful Interference Is As Follows

Rescue unit	Performance	Total sum per performance/piece (EUR)
Rescue Fire Brigade	Fire agent	from 1 280
	Fire extinguishers	from 30
	Fire tools	from 100
	Fuel consumption (100 km)	from 70
Emergency		
	Rapid medical service	from 50
	Price per km	0,79
	Alternate transport	from 200

This analysis is not final. It is a partial analysis that should be considered, at a minimal cost, to eliminate the emerging crisis situation in the form of an act of unlawful interference. The enumerated sum expresses the costs necessary for interference of one rescue team performance.

3.2 Determination of a Passenger's Health State on Board of Flying Aircraft

Deterioration of a passenger's health on board of a flying aircraft is an event that has occurred or is expected to happen to a person who is going to need primary or secondary healthcare on the ground (Civil Aviation Act).

The design diagram in Figure 3 shows the deterioration of the passenger's health on board of the aircraft. It displays the sequence of individual components being involved in the process of eliminating an extraordinary event from its origin to its resolution.
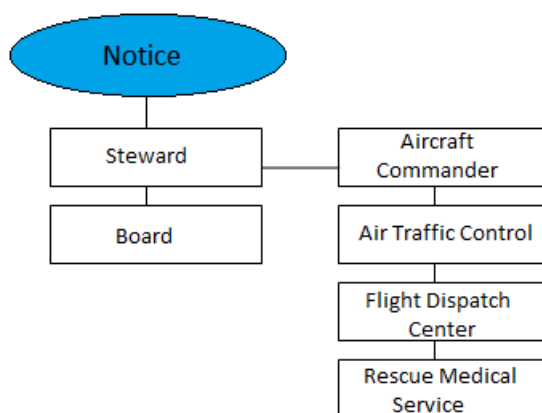
Figure 3. Design Scheme for Deterioration of a Passenger's Health on Board of an Aircraft

In the event of a passenger's medical condition worsened on board of a flying aircraft, the first medical aid shall be provided by the steward. Subsequently, the commander announces this event to the flight dispatching centre, which alerts the rescue service at the airport where the aircraft will land.

If an ambulance is not established at the airport, the patient is taken over by Emergency Health Service. The price for a fast medical assistance with mobile intensive unit equipment is approximately 50 EUR and the cost per kilometer of the aforementioned ambulance is 0.79 EUR.

Table 2. Financial Analysis of the Airport in the Event of the Passenger's Medical Condition Deteriorated on Board of an Airplane

Rescue unit	Performance	Total sum per performance (EUR)
Emergency		
	Rapid medical service	from 50
	Price per km	0,79

131

Table 2 shows the approximate sum of one emergency health service performance. The resulting amount of performances is approximately 50 € without counting kilometers.

2.3 Crowd Psychosis

Crowd psychosis is defined as the psychological state of a large number of people gathered, resulting in irrational behaviour that can lead to a threat to operations at an airport and on an aircraft, or to a threat to the health and life of the person (Civil Aviation Act).

The design diagram for crowd psychosis is shown in Figure 4. It depicts the sequence of involvements of individual components in the process of eliminating an extraordinary event from its origin to its resolution.
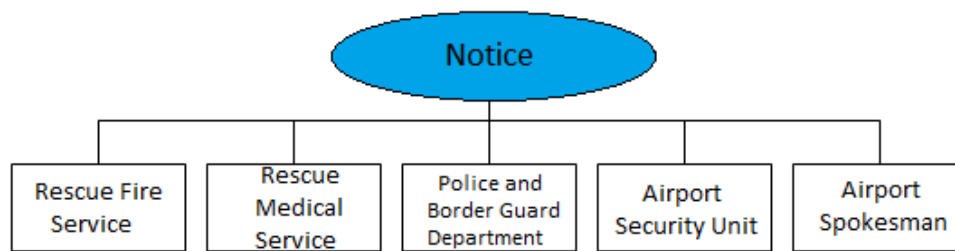
Figure 4. Design Chart of Crowd Psychosis

If the airport detects a situation that could lead to the crowd psychosis, the least costly way is to familiarize passengers with this situation by radio and to make sure passengers are assured of their safety.

In the event of crowd psychosis, the components of the rescue fire service and the emergency health service are activated. The cost of eliminating this extraordinary event is quantified based on the use of medical assistance and, if necessary, transportation of people to the hospital.

The costs of the rescue fire service in the case of crowd psychosis are not high as there is no need to use fire extinguishers, fire extinguishers and tools, but the fire brigade is still involved in eliminating this extraordinary event and can therefore count on the cost of fuel consumption.

The cost of fuel consumption, using one fire truck, ranges from EUR 70 per hundred kilometers.

The crowd psychosis raises panic among travelers, and it can happen that someone is injured. If the airport does not have its own ambulance on its premises, it brings injured and disoriented people to the medical points where the Emergency Health Service takes them.

The cost of a fast medical assistance is about 50 EUR and the cost per kilometer is EUR 0.79.

Table 3 shows the approximate sum of individual components involved in the occurrence of psychiatric psychosis at the airport.

The resulting amount, after counting all the items in Table 8, is equal to EUR 120. The sum counts quantifies of the costs needed for one rescue performance. It is the sum that should be counted, with minimal expense, in the onset of psychotic psychosis. The calculated sum increases depending on the

132

extent, severity and need to activate other rescue items.

Table 3. Financial Analysis of the Airport in the Event of a Situation of Crowd Psychosis is As Follows

Rescue Unit	Performance	Total sum per performance (EUR)
Rescue Fire Brigade		
	Fuel consumption (100 km)	from 70
Emergency		
	Rapid medical service	from 50
	Price per one km	0,79

4. Discussion

It is very complicated to quantify the exact financial costs of various types of crisis situations that can occur as a result of the passenger's behavior and fall within the airport's sphere of responsibility. Airports do not have any commercial pricing to calculate the exact amount. The quantification of the indicator is dependent on the amount of life-savings used, equipment and cooperation with other components.

Some airports do not create a budget for crisis situations and they have no idea of the cost of rescue services because they have liability insurance for the damage caused by operating at the airport in the event of a crisis situation.

5. Conclusion

The above-described financial analysis is just a simulated situation that predicts sums that can be discouraged and which should be counted when a crisis situation arises. The simulated analysis contains the final sum of the minimum costs required for the performance of individual rescue units. Each of these sums concerns only one performance of the rescue component, such as the departure of a firefighting vehicle, the use of a tool, or the exit of one rescue service. In crisis situations, it is also worth considering that the emergency of an extraordinary event can trigger a second crisis situation. In this way, it was possible to create a series of simulated crisis sessions that may occur within the airport, which many airports have been given an idea of the minimum costs needed to create for the crisis situation. All analyses would therefore provide the basis for prognoses of individual crisis situations that affect the stability and smooth development of the airport.

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