FUNCTIONAL TRANSFORMATION OF AIRPORTS DURING DISASTER RELIEF OPERATIONS

Abstract

The emergencies of a natural character are difficult to predict, instant and often catastrophic by consequences of the situation. It is almost impossible to prevent their occurrence, however science can reduce their impact on society, reduce risks concerning people’s lives, improve responsiveness using modern logistic approaches. As it is confirmed by a statistic data, the number of emergencies and their complexity increase every year expanding its coverage.

The parties who experience destruction often have the status of critical infrastructure facilities or extra hazardous objects, and airports are no exception. The role of airports in disaster relief operations is particularly important because they are the first to provide the humanitarian aid. They are the only places that can in the short terms provide access to remote places of any cargos, have their own security stuff and are equipped with a rescue equipment. Logistic flows are consistent and coherent. Their infrastructure integrity and readiness to respond fast are one of the priorities in the implementation of the rapid response programs, and in terms of loss of their integrity and safety of operations. Airports are the primary facilities for repair and recovery.

The main purpose of this article is to analyze the role of airports in the process of preparation for emergency and natural disaster relief operations. According to the study, the elements of airports preparation phase for emergency situations were created and their role in the process of natural disaster relief operations was structured. They emphasized the functions that airports can perform and the character of logistic flows during the phase of preparation and response to emergency situations.

Keywords: logistics of emergeny situations, logistic flows, a phase of emergency preparedness, logistic trends, airport’s logistics.

Introduction

Floods, tsunamis, disasters caused by man, terrorist attacks and many other emergencies visualize the current times as a picture of modernity. The struggle for human life constitutes a daily challenge for thousands of people.

Airports as critical infrastructure facilities play an important role in such a struggle. Since 1995 to 2015, 6457 of natural disasters that have killed more than 600 000 people and caused the damage for more than 4 billion people, were recorded. It is worth mentioning that each year brings over 200 million. People are suffering from
natural disasters [1]. The geography of natural disasters is quite different, but it does not reduce the objectives during the fight for human’s life (Fig. 1).

Fig. 1. The number of natural disasters between 1995 and 2015

Source: [1].

The preparedness’ phases of emergency management

On the basis of the practice observed, the basis of the struggle for human’s life is an emergency situation that is a well - formed process of preparing for its occurrence, and thus the readiness to respond quickly in the aftermath of the disaster. However, despite being aware of this fact, most countries do not undertake enough actions to get prepared for natural disasters. Threatening takes place in particular when emergency situations are of a cascading type [2]. One of the examples refers to the year 2011, where in Japan, the earthquake caused tsunami occurrence and the tsunami in turn led to radioactive contamination due to the damage of a nuclear power plant. Thus, the phase of preparation for an emergency is the most important phase as it provides answers to the questions such as when, how much, in what manner, by what means will be made the elimination of natural disasters consequences. During the planning phase, there should be performed the following processes [3]:

- planning responses;
- funding safety equipment;
- prediction of an approximate number of required resources, materials, medicines,
- specialists, medical personnel, rescue workers;
- construction of facilities to protect against natural disasters;
- analysis of potential risks;
- staff training;
- supply chain design;
- identification of bottlenecks for the entire system;
- forecasting a nature, volumes and intensity of logistical flows (flows of people,
- information, material resources, financial and other);
analysis and assessment of possibilities to perform the tasks of infrastructure
objects that have strategic importance in the process of establishing the logistical
flows in emergency situations;
contingency planning;
creating of early warning systems;
formation of alternative plans with an indication of the risk level and volume of
additional costs (both time and money).

The effectiveness of the above described processes is connected with the
statistical base, the availability of information on the previous experience of
overcoming an emergency situation, the type of a natural disaster that led to the
calamity (Fig. 2), the state of preparedness for all humanitarian entities and partners of
supply chain and infrastructure facilities that are included in the elements of a rapid
response.

As already mentioned, one of the elements of the phase preparation for
an emergency situation is to prepare logistics including all potential logistics flows.
Planning is a necessary process as it allows to take into account the volume of potential
needs by a region, a type of emergency and possible consequences and risks associated
with an infrastructure disruption. Based on the assessment’s requirements, the
information regarding product lists or tools that is necessary and could be insufficient in
the case of an emergency should be published. A list or the so-called "mobilization
table" is addressed to both individuals and legal entities that can commit themselves to
buy such assets. The formation of optimal reserves should be created as a result of the
planning phase and it constitutes the next challenge for logistics.

Fig. 2. The types of natural disasters

Source: [1].

Stocks should be related to each infrastructure unit which is included in the plan
for an emergency response. One of the most important and complex infrastructure units
(nodes) from the technical side, from the side of preparedness feature and from the side
of safety – are airports, since [4]:
– they are essential to receive or send aid in disasters and catastrophes;
– as fixed assets, they are vulnerable, expensive to replace, and difficult to be repaired
if damaged;
– planes and people can be moved or sheltered; airports cannot.
– airports have been targets for terrorists.

The role of airports in an emergency response involves receiving aid, dispatching aid, a quarantine (initial), a helicopter base for rescue and recovery, logistics hub – intermodal terminus, communications – node or backup, backup EOC, security area etc. In addition to the above scope, airports are often used as: mobile hospitals, quarantine (long-term), reunification centers, temporary morgues, logistics storage. This kind of usage reduces the efficiency of an airport as the main infrastructure facility during an emergency situation. Therefore, for the staff which is responsible to provide a rapid response, it is advisable to prevent from inappropriate spheres of it usage. As Walter White said: “In a disaster, the airport can substitute for almost anything else, but nothing can substitute for an airport”.

As regards the above, an airport can be a place for deployment of emergency response stuff. The scheme of respective headquarters is highlighted on the Fig. 3.

Usually, the first delivery of humanitarian aid is sent to the border crossing points (airports, seaports and land border crossings) during the first 24-72 hours after emergencies [5].

Such time contributes to overcoming the crisis emergency within a long-time dimension which it arose from, but is not sufficient to ensure responsiveness to the most important first 24 hours after the event.

![Fig. 3. The scheme of the rescue headquarters deployment](source: [5].)
Operative response should be provided by its own reserves. The sources of supply, volume of supply, priority of supply and its recipients are the main tasks for the headquarters in time of a rescue operation and during a preparedness phase to the emergency.

If necessary, external aid requests should be limited to only those resources that are not in the area of emergency. The planning phase of humanitarian aid delivery from external donors, entities within the country, must take into account an irregular nature of material flows and a large volumes of demand to the aid particularly in the first hours after a natural disaster, requiring appropriate stabilizing logistics solutions. The planning process of material flows in the form of humanitarian assistance should take into account not only the time for delivery of this type of assistance, but also the corresponding unloading, distribution and delivery of aid regarding the needs in most priority areas of emergency. The prioritization is a necessary process because resources are always in a limited quantity, and emergencies can have a cascading nature. The management of logistics flows during the emergencies with humanitarian cargo includes:

- identification of needs and provision of supplies to designated warehouses. Suitable locations are to be placed in a secure area and should be supplied by the necessary aid to a particular region;
- provision of warehouses dedicated to the humanitarian aid by proper equipment and security. The main task of warehousing logistics within humanitarian aid is to ensure its integrity and suitability for consumption in a short term, the availability of complete information on the condition, location, number and nature of reserves in stock;
- optimal distribution of humanitarian aid on the basis of the collected field data from affected areas. Ensuring the optimality is possible only by an operative and qualitative assessment of emergency consequences, the assessment of basic needs of the region and taking into account the existing stocks, stocks in transit, as well as aid which is expected to dispatch.

The role of an airport in an emergency situation

As already noted, airports play one of the most important roles in operations during the emergency response. Thus, in 2005 during the Hurricane Katrina, the New Orleans Louis Armstrong airport was closed to flights and opened for humanitarian operations, military units, etc., despite a partial damage of hangars. The terminals were also used as a base for evacuees and medical assistance (Fig. 4). Within a week after the Hurricane Katrina, the terminal has assisted to 27,000 of victims.

Among the victims, 3,000 people were evacuated by air, which was the largest air evacuation operation of its kind in the history [7]. The airport was chosen because it was the greatest, safest and best area to survive after the hurricane. As a result, eight mobile hospitals, companies that specialized in medical evacuation, sorting warehouse of medicines, evacuation center for refugees, the center for search and rescue operations in urban areas, the center for logistics, rapid response bases, were placed at its premises. However, there was no single command center. As noted [8] because of the unwillingness of the medical staff to subordinate with the team of experts from the FEMA, the agreement failed on forming a unified management system. As a consequence, the experts were not allocated for this operation. The New Orleans airport because of overcrowding at the neighbouring airports was the only communication hub for the whole region.
However, the use of airports during humanitarian operations in affected areas sometimes is a difficult task. Usually, the airports suffer from a significant damage because of the proximity to the epicenter of events due to the inconsistency and lack of readiness for emergencies, including natural disasters. In general, the airports can experience both a structural damage (an inability to use an airport for its purposes and within humanitarian operations), and damages of a nonstructural nature (the damages after an appropriate inspection can be eliminated or do not pose a threat and obstacles in the process of placing headquarters and evacuation centers at the airport). The above mentioned the New Orleans airport on the eve of the Hurricane Katrina had approved a plan of airport’s actions in emergencies, but it takes into account only terrorist attacks. In addition, there were several pacts and programs for assistance within neighbouring airports signed, however all of them were only related to air incidents. There was no document regulating activities of an airport in natural disasters, especially when the damage is caused not only to the Louis Armstrong airport, but to all airports located nearby. In addition, there were no agreements and a framework that would regulate the cooperation with the regional and national authorities. It was the reason that led to a partially collapse of the rescue operation and reduced its effectiveness accordingly.

Thus, an activity of the airport is impossible without detailed elaboration of an airport emergency plan which should include the following conditions [7]:
- rescue and medical aid for all victims;
- provide safe shelter and comfort to all affected;
- inspect and minimize a further damage to facilities;
- restore utilities and transportation infrastructure;
- restore airport operations-airfield/terminal and airport operations-landside
- operations as quickly as possible;
- coordinate with local, state and federal agencies for response and recovery;
- initiatives.
Airports’ recovery is a strategic task and should provide a staged process. The damaged airports primarily restore to deploy of the rescue operation and humanitarian assistance. The next step is to restore the passengers’ traffic. After strengthening (if necessary) of runways, restoration of hangars, permission to operate with commercial cargo’s should be provided.

The airports’ preparedness for emergency situations of natural and man-made disasters types is a system process which must be continuously improved taking into consideration the development of technologies and rising the amount of possible threats. Following this approach, the United Nations launched a comprehensive program GARD (Getting Airports Ready for Disaster) [9], which aims to simplify the process of preparing and exploring the advanced approaches to management in emergency situations.

**Conclusion**

Overall, the airport is a critical infrastructure object and its importance increases significantly especially during emergency situations of a natural character. Therefore, the formation of an airport as a critical facility should cover structural, organizational, policy, and defensive continuity of operations. The process of preparation of all structural units of the airport for emergency situations reduces the level of a damage and response time to an emergency situation, and it facilitates to a rapid recovery (Fig. 5).

![Fig. 5. Business Continuity Planning Concept in the case of earthquakes and other natural disasters](source)

Thus, as airports’ experience confirms, a preparedness phase is critical. Despite this, it is paid not enough attention to phase development. Coordination and cooperation of airports with state institutions, public organizations [11], rapid response authorities from both the private and public sector, army and medical institutions, neighbouring airports, logistical companies, construction companies, are an essential element for efficiency and human rescue during disaster management.
**BIBLIOGRAPHY**


