Number of Prohibited Items Not Accepted for Transportation as a Measure of the Threat in Civil Aviation

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ABSTRACT

An airport is a designated area on land, water or other surface, in whole or in part, intended for take-offs, landings and above-ground aircraft traffic, including permanent structures and construction facilities contained in its boundaries, entered into the register of airports [Air Law]. In accordance with applicable legal regulations regarding civil aviation security, air transport requires both the passenger and the airport manager to meet a number of conditions determining the ability to travel on board an aircraft. This is mainly related to the limitations imposed by national and EU legal regulations. The growing threat of unlawful interference results in further consequences in the form of tighter security controls at airports. Technological development, new ways and areas conducive to greater vulnerability, have a decisive impact on the methodology and the entire process of screening people and luggage. These activities are aimed, inter alia, at detection in a luggage carried by a passenger, a prohibited item that would serve to commit a broadly understood act of unlawful interference, which in turn may be, for example, a plane crash. No wonder that the airport manager, who is burdened with the main obligation to ensure that the passenger does not have access to prohibited articles on board the aircraft, undertakes a number of organizational measures to fulfill this obligation.

KEYWORDS: airport management, security screening, air transport safety and security, explosive detection system, explosive trace detection

1. Introduction

Annex 17 of the ICAO regulates safety issues by noticing and penalizing the phenomenon of unlawful interference in civil aviation. According to this document, acts of unlawful interference are acts or attempts to execute acts threatening the safety of civil aviation, which include, inter alia:
- unlawful capture of an aircraft,
- destruction of the aircraft in service,
- taking hostages on board aircraft or airports,
- forced entry onto an aircraft, airport area or aerodrome premises,
- bringing weapons or dangerous equipment or material for criminal purposes onto an aircraft or airport grounds,
- use of the aircraft in operation to cause death, serious injury or serious damage to property or the environment,
- providing false information that may endanger the safety of the aircraft during a flight or on the ground, as well as the safety of passengers, crew, ground staff or the general public, at the airport or civil aircraft facility.

The issue of screening people and baggage, which is the use of technical or other means to identify or detect prohibited articles [300/2008], is in turn regulated by such detailed documents as 2015/1998 or KPOLC, which precisely define the methods of security control. Passengers using this form of communication are already accustomed to the restrictions laid down in civil aviation. Society has accepted the fact that they have to give up certain

privileges (present in other areas of communication) for their security. Passengers traveling by plane can not carry in their cabin luggage items and substances listed, for example, in Appendix 4-C to Regulation 2015/1998. These are:

- pistols, firearms and other missile launch devices,
- stunning devices,
- objects with a sharp end or sharp edge,
- working tools,
- blunt tools,
- Explosives materials and devices as well as substances and devices,

2. Characteristics and number of items not accepted for transport

These objects can be used to commit a terrorist act. We can divide the attempt to bring prohibited items into two groups. The first includes passengers who are not aware that these items may pose a threat to civil aviation. These are usually passengers who relatively rarely use the aviation form of communication and do not have sufficient knowledge about the rules of civil aviation. It is also a group of passengers that does not pose a greater threat to the safety of air operations. However, prohibited articles they carry with them may serve other people to commit an act of unlawful interference. Their ignorance of the threat to aviation can be used by people planning a terrorist attack. Another group of passengers carrying prohibited articles are people who deliberately hide prohibited or dangerous articles in their luggage, with the intention of using them on board an aircraft. This is the most dangerous group of people, because of which it is the airport manager who performs security control. Due to the fact that the security guard is not able to assess to which group of passengers a given passenger belongs, safety control is performed in relation to all passengers with the same care and with identical standards. In addition, the safety of passengers is also affected by the fact that the first group of passengers who are unaware of the threat may serve the second group of passengers to terrorists as a tool for committing a criminal act. This can happen, for example, thanks to the so-called mule effect, where an unaware risk of a passenger is put into the luggage of an object or a dangerous substance. A passenger who is unaware of danger is successful with such luggage to the control point, where the security control operator analyzes the image of the X-ray baggage. At this point, it is worth mentioning the role of the security control operator that he plays in ensuring security at the airport. The safety of aviation operations depends on his skills, experience and training in the subject. What is extremely important here is the aspect related to the human factor, which has a huge impact on the way and effectiveness of the tasks performed by the operator. On the subject of assessing the effectiveness of the security control operator during its tasks, it was described in detail in the dedicated topic of the article (J. Skorupski, P. Uchroński, 2015). Nevertheless, it should be noted that in addition to the above-mentioned factors, the attitude of the security control operator to the duties performed is one of the most important elements determining the effectiveness of detection of prohibited items and substances in the passenger's luggage. In this case, it is extremely difficult to assess the effectiveness of the tasks performed by the operator. Not every mistake of the security control operator, which overlooked the presence of a prohibited item in the baggage, consequently results in an act of unlawful interference. On the other hand, no additional, repeated security check is carried out, which would verify the correctness of its implementation by the previously controlling security control operators. For this reason, when attempting to evaluate both the effectiveness of security controls performed by the security control operator and attempts to determine the scale, the quantities carried by passengers of prohibited articles, we can only use intermediate values, which, after detailed analysis, provide us with reliable information on the subject. To this end, a number of tests have been carried out at the International Airport to determine the number of prohibited items questioned by the operator of security checks and not allowed to be carried on board an aircraft in a given period of time. These tests were carried out with the participation of security control operators, who during the actual traffic recorded in the survey the number of items not allowed and their type. These tests were carried out on several samples containing 100 passengers passing through a security checkpoint within a given time interval. The results of the conducted tests are presented in Table 1.

Table 1. Number and type of items questioned during security screening [own study]

No.	Data	No. of security line	Number of objects not allowed for transport at 100 pax	Type of item
1	23.03.2018	2	3	liquids
2	26.03.2018	1	4	liquids
3	27.03.2018	3	6	liquids
4	26.03.2018	4	4	liquids
5	26.03.2018	3	1	liquids
6	27.03.2018	1	8	liquids, 1- pocket knife, 1 - scissors

As can be seen from the results of the survey, for every 100 passengers passing through a security checkpoint, only on average over 23 passengers have a prohibited item with them. The summary shows the number of items that were noticed by the security control operator during the control. The vast majority of the objects questioned concerned liquids above 100 ml. It should be noted, however, that this result may also be influenced by the season, which also decides in a certain way on the type of items carried by passengers. Taking into account the results of the conducted tests, it should be assumed that only about 4% of passengers traveling by air carry a prohibited item. Such a situation may have its justification in the growing popularity of traveling by air transport.

3. The impact of passenger security awareness on the number of objects disputed

Along with the increase of this popularity, naturally, the knowledge and awareness of passengers about the rules of the airport is also increasing. The conducted research has shown that it is the fluids that constitute the largest percentage of objects questioned. In the analyzed situation, out of the 26 objects questioned, only two cases concerned objects other than liquids. This is due to the imprecise transfer of information regarding the rules for the carriage of liquids. The legal regulations speak about the ban on the carriage of aerosols and gels or substances of similar consistency. This full information is not always remembered by passengers, which may be the reason that in their luggage there are substances mentioned above. Of course, at the security checkpoint, there are also promils of passengers who bring in other types of prohibited items such as scissors or penknives. However, it is a very small group of people who either rarely travels by plane or is unaware that they have left such an object in the travel bag. Analyzing the topic related to the control of hand baggage security and the detection of prohibited articles, it is impossible not to discuss the subject in the context of this phenomenon. It will of course vary depending on the size of the port, its location or even the profile of the airport's character, however the percentage distribution of the number of items transferred by the passenger and detected prohibited items will be very similar and proportional to the volume of passenger traffic at a given airport. The research that was carried out in this area took place at the Katowice International Airport, where passenger traffic is at the level of 3.9 million in 2017 departing and arriving passengers. For comparison, in 2016, 3.2 million passengers were checked. On the basis of available transfer protocols for utilization of prohibited articles questioned during the screening of passengers' safety, one can observe how the relationship between the number of passengers and the number of prohibited articles in question is shaped from year to year. Table 2 presents a list of prohibited items disposed of in 2015-2017. Due to the fact that for the purposes of utilization, individual categories of objects are divided and weighted, the list shows only the mass expressed in megagrams of objects not allowed on the plane (liquids and prohibited metal objects).

Table 2. Number of prohibited items not allowed for transport [own study]

Year	Metals(Mg)	Liquids(Mg)
2015	6	73
2016	4,8	58
2017	4	42

Research conducted with the participation of security control operators showed that for every 600 passengers passing in a given time interval, only every 23 passengers carried the item with them, first and foremost, the liquid which was not accepted for transport. This is only a percentage of around 4% of passengers who have a prohibited item or substance with them. On this basis, we are able to determine the approximate number of passengers who, due to the fact that they have a prohibited object with them, will require a more detailed security check. In addition, research conducted at the Katowice International Airport also shows what is the division of prohibited items carried by passengers due to their type. Based on the discussed case, we can state that out of the 26 prohibited items brought in, only 2 items were the tools of a sharp scissors knife, which is about 7.7% of all prohibited items transferred. These data, in turn, already allow quantitative and qualitative determination of prohibited items to be expected at the security control point. Of course, the final number will depend on the size of checked passenger traffic, but nevertheless they allow to assess the level of passenger awareness in the field of civil aviation security and to plan appropriate organizational and infrastructural activities. Such simulation can be carried out for planned passenger traffic. Information in the discussed area is provided in Table 2, which shows the increase in the number of prohibited items depending on the growth of passenger traffic. The conducted research allows to assess the impact of passengers' awareness regarding the security principle on the capacity of the security control point, and thus provide the opportunity to properly plan the necessary terminal and hardware infrastructure.

4. The relationship between the number of forbidden objects and the effectiveness of the work of security control operators

Having information on the number and categories of prohibited articles, it is impossible not to mention the issue related to the quality of security control being carried out, understood as the effectiveness in detecting prohibited items carried by passengers. We do not have information on the number of prohibited items not detected by OKB. If that were the case, it would be possible to take action to eliminate possible irregularities in the way security controllers work. However, to be able to verify the quality of work of security control operators, a training and verification system was created, based on the projection of virtual images of prohibited articles (TIP-Treat Image Projection). Such a virtual prohibited item is superimposed on the image of the really X-rayed luggage, and the security control operator is to detect its presence and confirm this fact by pressing the appropriate button on the x-ray equipment control panel. Thanks to this tool, it is possible to assess the quality of the work of the security control operator in a given time interval. In the case we analyzed on March 23, 26 and 27, 2018, the detection of prohibited items carried by passengers can be assessed using dedicated software. It can be noticed then that only 12% of prohibited articles are misinterpreted by the security control operator. However, taking into account the possibility of the operator making a safety check error in the determination of TIP, this value in practice may additionally change in favor of

the quality and efficiency of the work performed by the operator. The summary presented in the Table 4 shows the total number of luggage, the total number of TIP and the number of incorrectly identified virtual prohibited items.

Table 4. A list of the amount of detected luggage [own study]

23.03.2018r.		26.03.2018r.		27.03.2018r.	
Number of baggage	7669	Number of baggage	8791	Number of baggage	9956
Number of TIP	198	Number of TIP	218	Number of TIP	237
Number of detected TIP	174	Number of detected TIP	185	Number of detected TIP	207
Nomber of undetected TIP	24	Nomber of undetected TIP	33	Nomber of undetected TIP	30
Number falsely marked	135	Number falsely marked	151	Number falsely marked	188

5. Conclusion

The conducted research shows the direct dependence between passengers' awareness of the rules applicable to civil aviation security and the number of items that are not allowed to be carried on board an aircraft. One should notice a certain tendency associated with the society becoming accustomed to existing restrictions and their acceptance in the name of a higher good which is security. Increasing passenger awareness mainly concerns bans that have been in operation at airports for many years. An expression of this state of affairs is the minimal amount (in relation to the number of passengers) of metal objects such as scissors knives or other sharp tools. We can certainly depend on this dependence on the type of passengers using air transport, frequency of flights they make, and destinations, but this issue will be the object of the authors' interest during further research. The conducted experiments have also shown that this aspect related to passenger safety control can have a significant impact on the process of planning dedicated infrastructure. It also allows determining the need for the number of security control points, the necessary equipment and determining the costs of maintaining and operating the available infrastructure related to the passenger safety check. Research also raises an important issue related to the awareness of passengers as a factor affecting the way, but also the quality of security control. Spreading the passenger's awareness in the discussed area is an important contribution not only to the optimization of the entire

passenger safety control process, increasing the capacity of the security control point, but also positively affects the quality and effectiveness of the security control. This is all the more important since the sense of security among the society triggers in it a kind of control of the environment in which the passenger is, thus reducing the vulnerability of such a place (in this case the airport) to the occurrence of a situation threatening safety. The security control operator may then only focus on searching for dangerous objects hidden in the bag, which can be consciously used on board the aircraft to commit an act of unlawful interference.

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