Selected Terrorist Attacks in Civil Aviation in the Early Part of the 21st Century

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Abstract: Developments in transport, the world’s geopolitical order and technical innovations at the beginning of the millennium have also brought the real threat of terrorism back to civil aviation. The biggest catastrophe was the terrorist attacks of September 11, 2001 in the USA. Following this event, global terrorism became a much-discussed issue in today’s world, while current threats have motivated significant improvements and tighter security in civil aviation in all developed countries around the world.

Keywords: civil aviation, terrorism, security, air transport, civilian casualties

1. Introduction

Global terrorism became the most widely discussed threat to the civilian population at the beginning of the 21st century. The fact that this threat was not ephemeral but real was demonstrated by many terrorist acts “successfully” committed around the world. The key event was the massive attacks on September 11, 2001 against targets in the United States. The scale of these attacks led to a new perception of the threat of terrorism [1]. In the following years, in addition to changes in the understanding of security of a geopolitical nature, there has been a slew of new terrorist attacks. Some were successful, some were detected in the preparatory phase, or thwarted during execution. The common denominator of many was deliberate targeting of air transport, civil aircraft and passengers as the primary target [2]. The effectiveness of the September 11 attacks became a strong motivating impulse for other attackers who wanted to promote their interests through successful acts of terrorism. Although terrorist attacks against civil aviation have occurred in the past, especially in the 1970s and 80s, the beginning of the new millennium has brought a new qualitative wave in the effectiveness of attacks and their impact on modern society [3,4]. Civilian aircraft have become an ideal target due to their vulnerability in terms of security. The fact that attacks on civilian aircraft or using civilian aircraft are extremely effective in terms of their impact has also played an important role. It was the tragic consequences of the events of September 11 that showed the extraordinary danger posed by hijacked civilian aircraft, not only to the crew and passengers, but also to people on the ground. Awareness of this vulnerability has led to widespread innovation in air transport security as a whole [5]. These changes have in some way affected all entities involved in air transport, from passengers to crew and airport staff. Aircraft and airport buildings themselves have also undergone significant changes. Unfortunately, further terrorist attacks have taken place in civil aviation and despite the money spent, we cannot expect to completely prevent terrorist acts against aircraft and civil aviation as a whole in the future.
2. Methods

Appropriate methods of scientific research and their evaluation were chosen to fulfil the task.

The primary method used was the critical historical description of events based on a study of national and foreign professional literature. A method of data comparison was chosen to extract the acquired knowledge, in which identical indicators were compared for each selected attack. An overall summary of the information obtained was performed by an analysis of the findings. The pilot analysis was used to identify the most common types of terrorist attacks in civil aviation, followed by an analysis of six selected terrorist acts in air transport to assess basic security factors relating to civil aviation and modern terrorism. The selected attacks all took place in the early part of the 21st century, and each had a somewhat unique impact on the civil aviation sector, including the introduction of new security regulations in civil aviation.

The timeline of events became the key for comparison. The comparison focused on a general historical description of the selected events and specific analysis of the manner in which the acts were conducted, the motivation of the attackers and the impact of the selected terrorist acts on civil aviation and passenger safety.

Selected attacks:
1. September 11, 2001, USA
3. Transatlantic aircraft plot, 9 - 10 August 2006
5. Al-Qaeda 2010 – “cargo plot”, October 29, 2010
6. Metrojet, flight 9268, October 31, 2015

2.1 Manner of terrorist attacks in civil aviation

The most common and most dangerous mode of attack was hijacking. This was followed by attacks on the crew or passengers that were not aimed at hijacking the aircraft and an attack on airport personnel or airport infrastructure outside the aircraft. A specific type of attack was the targeted destruction of the aircraft, crew and passengers. Each of these types of attack could be committed in different ways depending on the goals and means used. From a terrorist perspective, hijacking aircraft was, and still is an extremely attractive target, because the terrorists not only gain the aircraft itself, but also the lives of the people on board. This fact could be documented in the following cases:

- Hijacking of El Al flight to Capri, 1968
- Hijacking of Air France flight to Entebbe, 1976
- Hijacking of Air France flight in Algiers, 1994

The above attacks were acts of terrorism with a political motive, in the last case a suicide bombing was probably to have been committed [6].

Bomb attack - this was always a direct attack on an aircraft, which was intentionally destroyed. The terrorist group thus demonstrated a specific target. In these cases, the plane was turned into a weapon, or an evident effort to create as many civilian casualties as possible [7].

- Air India Flight 182, 1985, destroyed over the Atlantic Ocean
- Lockerbie, Pan Am flight, 1988, destroyed over Scotland
- Metrojet Flight 9268, 2015, destroyed by a bomb planted on board on a flight from Sinai

Guided missile - the hijacked plane used as a means to destroy another target

- American Airlines Flight 77 from Washington to Los Angeles, which was directed at the Pentagon by terrorists on September 11, 2001
- United Airlines Flight 93, which crashed in Pennsylvania after a skirmish between terrorists and passengers, the target was allegedly the Capitol on September 11, 2001
- United Airlines Flight 175, which was taken over by terrorists and flown into the south tower of the World Trade Centre on September 11, 2001
- American Airlines Flight 11, which was flown into the north tower of the World Trade Centre by terrorists on September 11, 2001

Attack on airport infrastructure - an act aimed at airport infrastructure or against civilian ground personnel

- El Al airliner attacked on the runway in Athens, 1968
- Attack by Palestinian terrorists at the airport in Rome, 1973
- Attack on passengers at Vienna Airport, 1985
- Unsuccessful attempt to rescue Israeli athletes at the airport in Munich-Fürstenfeldbruck, 1972

3. Results and discussion

The terrorist attack on September 11, 2001 was a completely new phenomenon of terrorism in aviation, followed by other similar efforts by terrorist organizations to carry out a similarly effective attack on a civilian target using a transport aircraft. All these terrorist attacks analyzed here, carried out between 2001 and 2015, have this characteristic. By carefully analyzing these attacks just defined a new trend of stricter security measures in civil aviation.

Selected attacks:
» September 11, 2001

As part of the attack, four American Airlines
and United Airlines flights were hijacked on various domestic routes on September 11, 2001.

- **American Airlines Flight 11** from Boston to Los Angeles. The Boeing 767 was hijacked by five terrorists and crashed into the north tower of the World Trade Centre. There were 92 people on board.
- **United Airlines Flight 175** from Boston to Los Angeles was hijacked by five terrorists and crashed into the south tower of the World Trade Centre. There were 65 people on board.
- **American Airlines Flight 77** from Washington to Los Angeles. The Boeing 757 crashed into a wing of the Pentagon. There were 64 people on board.
- **United Airlines Flight 93** from Newark to San Francisco was hijacked, but passengers revolted on board. The Boeing 757 crashed in Pennsylvania; the anticipated target was the Capitol building. There were 44 people on board.

All of the terrorists, a total of 19, were linked to the al-Qaeda terrorist organisation led by Osama bin Laden, who was identified as the ideological leader of the attack. Bin Laden claimed responsibility for the attack in a video, probably shot in the mountains of Afghanistan or Pakistan. Another senior al-Qaeda official responsible for the attacks was Khalid Sheikh Mohammed, the ideological architect of the attacks on the World Trade Centre in 1993. He was detained in a joint operation by the US and Pakistani secret services in Rawalpindi, Pakistan, in March 2003. He repeatedly confessed to preparing the attacks [8]. The terrorists were led by Egyptian Mohamed Atta [9]. The attack was long prepared and decisively coordinated to be the culmination of al-Qaeda's terrorist activities at the turn of the millennium.

Civilian aircraft were deliberately chosen because of their ability to be used as highly effective guided missiles, capable of inflicting extensive damage on impact and achieving the highest possible number of civilian casualties. The terrorists also discovered a certain laxness in airport security and insufficient protection for flight crews. The hijacked aircraft lacked a cockpit security door. Interestingly, 15 of the 19 attackers were citizens of Saudi Arabia, an official ally of the United States [10]. The probable leader of the Atta attackers was also in Prague prior to September 11, and was probably the man also later investigated by the Czech authorities [11]. This information was verified by questioning editorial staff, who stood behind their claim. However, due to the sensitivity of the whole incident, source data was not provided. The terrorists disguised themselves as ordinary passengers. The aircraft were then transformed into guided missiles and directed at pre-selected targets, where the aircraft’s kinetic energy and fuel supplies were used for greater explosive effect. It was to ensure full fuel tanks that the terrorists chose flights from the east to west coast of the USA. The plan only failed on Flight 93, which crashed in an undeveloped area in Pennsylvania due to a revolt by the crew and passengers [12]. The other attacks were successful, especially when they hit the towers of the World Trade Centre (WTC), where the destructive power of the fully fuelled aircraft combined with high kinetic energy became fully evident. The successful way in which the attacks were carried out resulted in the fall of both WTC towers after burning for several hours. The terrorist attack in the United States marked the most extensive change in security policy of the early 21st century. It directly initiated a new strategy to combat international terrorism, known as the Global War on Terror (GWT). The US initiated a war in Afghanistan, Iraq and a number of smaller operations around the world [3]. Increased checks at airports were introduced. All airline companies introduced cockpit security doors that separate pilots from passengers. The use of air marshals - armed guards on board flights - has become common. The attacks had a specific impact on US internal security by introducing several specific laws that significantly affected the privacy of US citizens. The best known being the Patriot Act [13].

**Russia 2004**

On the night of August 24, 2004, two domestic flights crashed at two locations in the Russian Federation. In both cases, these were aircraft of Soviet provenance, a Tupolev Tu-134A-3 and Tupolev Tu-154B-2, old, but reliable machines. All passengers and crew died on both flights.

- **Volga - Avia Express Flight 1353.** The plane took off from Moscow Domodedovo Airport on a regular flight to Volgograd. There were 35 passengers and 9 crew members on board the Tupolev Tu 134. Communication with the aircraft was lost after less than half an hour in flight, shortly before eleven o’clock in the evening, in the region of the city of Tula, less than 200 kilometres from Moscow. The wreckage of the aircraft was found over a large area, which indicated the plane had broken up in the air. There were no survivors. Reports of this attack have been repeatedly scrutinised and analysed [14, 15].
- **Siberia Airline Flight 1047.** The plane took off from Moscow’s Domodedovo Airport on route to Sachi in southern Russia. The Tupolev Tu 154 aircraft had 38 passengers and 8 crew members on board. The flight disappeared from radar in the Rostov region around eleven o’clock in the evening. The wreckage of the plane was found...
in southern Russia the next morning. No one survived the crash. Here too, the remains of the aircraft were found over a large area [14,15]. The attack was carried out with the help of two suicide bombers. It is likely that the explosive, which was identified as RDX during the investigation, was strapped to the bodies of the attackers [15]. The method of initiation was not and is not known. The explosives were undoubtedly detonated during the flight, resulting in the immediate destruction of the aircraft and death of all passengers and crew. After these disasters, Vladimir Putin ordered an immediate extensive investigation. He entrusted this task to the Federal Security Service (FSB). The investigation quickly determined the cause of the crash of both aircraft as a terrorist bomb attack on board the plane. Further evidence came from an analysis of security camera footage from the wreckage and the work of the secret service. Chechen separatist Shamil Basayev subsequently claimed responsibility for the attack. The investigation showed that the aircraft had indeed disintegrated in flight. Amanta Nagayeva was identified as the bomber in the case of flight 1353 and Satsita Dzhebirkhanova in the case of flight 1047 [14]. Both had lost male relatives in fighting in the Caucasus, which they blamed on the Russian armed forces. There is probably no clear reason for the attack, it was one of many terrorist attacks against civilians in the Russian Federation committed by Chechen separatists. The investigation showed that the attack was also successful due to the human factor. Security regulations at the airport had been breached. Mikhail Artamonov, a member of security services, was blamed as the direct culprit when it was found he had failed to conduct a sufficient check of both bombers. He was later sentenced to six years in prison in court. Others convicted were Nikolai Korenkov and Armen Aratyunyan, both of whom were said to have accepted bribes, which was how both attackers got on board the aircraft. Both were sentenced to unconditional sentences for taking a bribe and violating security regulations [16,17].

» Transatlantic aircraft plot 2006

The Transatlantic aircraft plot was a failed attempt at a terrorist attack on flights from Great Britain to the USA. The plot was discovered by British police (secret services). The attack itself was to take place on 7 overseas flights. On the night of 9-10 August 2006, British police detained 20 suspects. All perpetrators and accomplices had been under surveillance for some time. The reason for the surveillance was a link between suspicious activities and known terrorists and a suspicious interest in civil aviation. The specific reason was suspicious handling of empty soft drink bottles. The investigation confirmed concerns regarding the preparation of a large-scale terrorist attack on civil aviation. The scale of the planned attack surprised even investigators. The targets were to be flights to Washington D.C., New York and California by American Airlines, United Airlines and Air Canada, all taking off from London Heathrow Airport [18]. Due to the disrupted preparation of the attack by the timely intervention of the secret services and police, the attack did not take place. The investigation revealed that suspects had travelled to Pakistan as part of earthquake relief efforts, where they may have linked up with a local network of terrorist organisations, including al-Qaeda [19]. Some of those investigated also had links to Pakistani and Indian terrorists. The exact motive for the attack is unclear. Liquid explosives were to have been smuggled on board the aircraft in hand luggage disguised as soft drinks and liquid hygienic products. Specifically, this was supposed to be acetone peroxide, which is highly unstable and responsive to heat and shock. There was speculation about the possibility of initiation using an electric detonator in the attack. It was the suspicious handling of peroxide bottles that was one of the reasons for revealing the group’s surveillance. In this case, the attack failed, but there were extensive changes in air transport, which had a global impact. All airlines banned bottles and liquids from being carried on board aircraft according to an ICAO decision [20, 21]. The only exception were liquids purchased in Duty Free Shops and liquids of small volume placed separately in sealable bags with a maximum volume of 100 ml per package. Passengers were not permitted to have more than 1 litre of liquids in total. Thus, although unsuccessful, this attempted terrorist attack had the largest impact on civil aviation since September 11, 2001.

» Northwest Airlines 253

This attack took place on December 25, 2009 on a regular flight from the Netherlands to Detroit. The attack was ranked as a realised attempt because one of the 287 passengers on board tried to initiate several grams of explosive (pentrite) hidden in his underwear a few minutes before landing. Suspicious behaviour alerted passengers and crew, who overpowered the suspect and handed him over to security after a successful landing. The attacker was secured and taken for treatment due to burns suffered from the initiation of the explosive. Three people were injured in the operation, the attacker and two intervening passengers. The key factor was the fact that the explosive failed, otherwise the A 330-323 would have crashed shortly before landing with tragic consequences for everyone on board. Umar Farouk Abdulmutallab, a Nigerian
national was identified as the perpetrator [22]. An investigation into the detained Nigerian attacker revealed his connection to radical Islamists in the Arabian Peninsula. The ideological architect of the attack was identified as radical imam Anwar al-Awlaki, an American citizen who fled to Yemen, where he became the leader of a local offshoot of the al-Qaeda organisation, known as al-Qaeda in the Arabian Peninsula. Awlaki was a radical imam who repeatedly attacked the United States and its allies in his speeches, in particular accusing them of aggressive international policies and the targeted killing of the Muslim population in Iraq and Afghanistan. The attacker himself was trained in Yemen under the leadership of Awlaki [23]. Prior to landing in Detroit, Omar Faruk Abdulmutallab went to the bathroom, where he spent several minutes. After returning to his seat, preparations for landing in Detroit had just begun. The perpetrator tried to initiate the device hidden in his underwear by injecting a small amount of acid into the powdered explosive. The resulting reaction was to have caused an immediate explosion. Due to the fact the attacker was seated near the fuel tanks in the wings, there was to have been an extensive explosion and destruction of the plane before landing. Apparently, due to incorrect manipulation there was no explosion, but only partial combustion on the offender’s body. The smell, the smoke and screaming attacker drew the attention of the crew and passengers. Although there was no air marshal on board, crew members and some passengers overpowered the attacker and the aircraft landed safely [24]. Due to the nature of this attack, the failure of the incident meant a further tightening of passenger baggage checks. An increase in the use of full-body scanners and the consistent check of fluids carried on board became a common part of passenger screening [25].

» Al Qaeda 2010 – “cargo plot”

This was a terrorist attack discovered in the final phase of implementation. On October 29, 2010, two cargo shipments were found, one at East Midlands Airport in England and the other at Dubai Airport in the United Arab Emirates. The suspicious shipments were detected due to secret information from Saudi security forces regarding suspicious shipments from Yemen, disguised as toners for printers. The addressees were synagogues in Chicago, USA. It was interesting that the names of the addressees were real figures from the history of the Crusades and Spanish Inquisition. The shipments were sent from Sanaa in Yemen. The highly sophisticated devices were probably meant to detonate in flight over Chicago Airport [26]. An extensive investigation showed that the attack was devised by an offshoot of al-Qaeda, known as al-Qaeda in the Arabian Peninsula. As with Northwest Airlines Flight 253, Anwar al-Awlaki was behind the attack [23]. The whole attack was planned and prepared in Yemen under his leadership. The reason may have been the failure of an operation the previous year, when Omar Faruk Abdulmutallab was arrested following an attempted attack. The plan was probably to destroy the aircraft at flight level, shortly before landing in Chicago. If the attack had been successful, it would have used the aircraft as a guided missile. The investigation confirmed that the explosive was highly concentrated pentaerythritol pentenyl tetranitrate. In both cases, several hundred grams of explosives were found with sufficient capacity to destroy the aircraft. Mobile phones were used as detonators [16]. The attack was discovered thanks to the cooperation of secret services. The ability to conceal explosive material in cargo areas necessitated changes in security. An essential element was a ban by many airlines on carrying consignments from Yemen. A more general measure was a ban on carrying toners for printers on board aircraft [27]. Last but not least, the number of scanners was increased at many airports.

» Metrojet 9268

A flight by Russian Metrojet from Sharm el-Sheikh in Egypt to St. Petersburg crashed over the Sinai Peninsula shortly after take-off on October 31, 2015. All 224 passengers and crew died in the crash. This was the worst air disaster in Russian civil aviation history. The investigation provided clear evidence that the aircraft had been destroyed by an explosion on board, with a charge of one kilogram of TNT [28]. An offshoot of the Islamic State of Iraq and the Levant (ISIL) operating in the Sinai Peninsula known as Ansar Bait al-Maqdis, soon claimed responsibility. It released a statement confirming the attack on Twitter and subsequently in its propaganda magazine Dabiq [29]. The reason why a charter flight of tourists from Eastern Europe was targeted is not entirely clear. ISIL itself published photographs of a bottle of Schweppes with an explosive inside and a trigger mechanism [29]. The
investigation revealed a mistake on the ground by Sharm el-Sheikh airport staff. However, Russia’s entry into the civil war in Syria on the side of Bashar al-Assad and an increase in the number of military operations by Russian forces had a greater impact. The Russians themselves repeatedly denied that the increase in their military presence was related to the attack on Metrojet flight 9268, however, the presence of the Russian army in the region became a reality. [30] Hijacking aircraft has been and is well known in history, and the second half of the 20th century was marked by many such incidents [7]. The successful hijacking of a flight with passengers was and is a very dangerous form of terrorism, which gives terrorists exceptional room to negotiate their demands, or as an extremely effective weapon [3]. This trend was confirmed by the al-Qaeda attacks on September 11, 2001. Despite extensive security innovations affecting civil aviation, the sector could not avoid further attacks [8,31]. This was followed by attacks in Russia in 2004 and attacks discovered in the preparation phase in 2006-2010. Of the most recent successful attacks against civilian aircraft was the attack on the Russian airline Metrojet in 2015 over the Egyptian Sinai Peninsula. During the period under review, aircraft were used as guided missiles in the attacks of September 11, 2001, and were probably intended to be used this way in 2006 in the Transatlantic aircraft plot, in Northwest Airlines Flight 253 in 2009 and in the cargo plot of 2010. In contrast, bomb attacks to purely destroy aircraft can be documented in the attacks in Russia in 2004 and the destruction of the Metrojet flight in 2015. All successful attacks were fatal for passengers and crew. This particularly applies to September 11, 2001, the attacks in Russia in 2004 and the Metrojet flight. In all the selected attacks, we can unequivocally say that the perpetrators were radical Islamist organisations. The perpetrator was most often al-Qaeda and its separate offshoots, followed by the Islamic State and Chechen terrorists. The analysis also showed that virtually all attacks resulted in significant changes in civil aviation security regulations. This corresponds to the analysis of the attacks in 2001, 2006 and 2009, when separate areas in aircraft, a ban on liquids and full-body scanners were gradually introduced. The global impact of terrorist attacks on all passengers has been clearly demonstrated, as has the impact of terrorist attacks on national decisions on international and domestic security issues. This demonstrably relates to the attacks of September 11, 2001 and subsequent US policy, known as the GWOT policy [4]. There is also no doubt of the wider involvement of Russian troops in the conflict in Syria following the attack on the Metrojet flight and operations against Chechen separatists in the Caucasus. Terrorist attacks are also responsible for the modernisation and intensification of civil aviation security measures worldwide. There has been significant intensive research in all related fields to improve technical parameters, which can be further used technologically to increase the security of civil air transport. The results could also be used in the aviation industry, although the use of this research is much wider [32]. Terrorist attacks in today’s world have not only been, but continue to be a real threat that must be addressed at international level, as the impact on ordinary citizens can be fatal [33].

4. Conclusion

Modern global terrorism has posed and continues to pose a highly topical security threat to the civil aviation sector. Air transport has always been a tempting target for terrorists, but efforts to make attacks more destructive have meant growing interest in this transport sector since 2000. It’s clear from the comparison that the civil aviation sector has been a primary terrorist target. This was also documented by the number of tragic attacks after 2001. Subsequent counter-terrorism measures cannot completely prevent further terrorist attacks, but only reduce the risk of an attack. It has been shown that a significant proportion of terrorist attacks on international civil aviation have had a significant impact on the international security system and on the security policies of the countries concerned.

The conclusions of the analyses of these terrorist attacks have led to clearly defined, more stringent measures in civil aviation:
- Stricter pre-flight check-in controls
- Use of whole body scanner in control process
- Tighter control of electronics
- Introduction of a security door into the cockpit
- Prohibition on carrying liquids on board (only small contents up to 100 ml allowed)
- Control of delivered food (purchase after check-in)
- Increase presence of air marshalls
- Improving the cooperation of security experts in civil aviation

We can expect any further attacks on civil
aviation to have a similar impact in the future, but we must repeat once more, that each selected attack resulted in stricter security measures, which meant greater safety for passengers an aircraft, too. It must be admitted that this limited the comfort of the passenger, but according to Maslov’s hierarchy of needs, human safety is superior to the pleasure of traveling.

References


