

# 1. Introduction

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Although terrorist attacks on aviation are not a new phenomenon – the earliest hijacking occurred in 1931, the first bombing two years later – they pose a greater threat to this vital transportation mode than ever before. In 2016 alone, two planes were hijacked, one was bombed, and four airports, a popular new target, were attacked. Aviation is today a favored target of terrorists because of its vulnerabilities and the human, psychological and economic toll that a successful attack achieves.

Ironically, one of the reasons that aviation represents such an attractive target is the degree to which it has emerged as an enormous global activity. Every day millions of people across the globe arrive at an airport to take a commercial flight, many others fly their own planes or climb aboard a private jet. And, those passenger jets carry tons of cargo, while air freight carriers transport millions more.

Each of three basic dimensions, passenger, air cargo, and general aviation, has grown dramatically. In 1975, the world's airlines carried about 9.5 million persons, by 2015 that number had more than tripled to almost 33 million. Air cargo has grown even more, from 15.570 million ton kilometers in 1975 to almost 190 million in 2015. According to the World Bank, the industry provides over 60 million jobs and generates over \$25 trillion. Clearly, aviation plays an ever increasing role in connecting people across the world and in the functioning of the global economy as well as in the economies of individual states. Disrupting air transport thus affects not only the country whose airport or airline is attacked but produces ripple effects that impact many other countries as well.

The very size and complexity of aviation greatly complicate efforts to protect it from a terrorist attack for each of these dimensions and poses unique security challenges. Securing airports involves dealing with large numbers of people, not only the enormous numbers of passengers who pass through but the large number of employees, any one of whom may turn out to be, as has been the case, a terrorist. Terrorists are fully aware of these vulnerabilities and have moved, tragically with success on too many occasions, to exploit them.

Though aviation had been subject to numerous hijacking and bombings for decades, a turning point came in 1968. Until then, attacks had been carried out for individual motives and consisted of two types. The first involved hijackings by individuals seeking to escape to a better life, whether from behind the iron curtain or from Cuba. The second consisted of attacks that were carried out by individuals with personal motives such as robbery or to collect insurance. On July 23, 1968, however, a very different motive led three members of the Popular Front for the Liberation of Palestine (PFLP) to hijack an El Al Flight, a political one. Though everyone aboard was released after 40 days of negotiations, a precedent had been established. In addition to personal goals, revenge or money, attacks on planes could be designed to achieve a political objective, in this case to draw attention to a cause and to achieve the release of political prisoners.

Now that it was apparent that attacks on aviation could promote political goals, it was inevitable that some organization would do so more violently. That tragic event took place two decades later, in December 1988, with the destruction of Pan Am 103 over Lockerbie, Scotland. Two hundred and fifty-nine passengers and crew plus 11 local inhabitants were killed. Another turning point had been reached, for though the goal was also political, the objective was to sow terror and inflict psychological and economic damage.

However, it took some time before the importance of achieving effective aviation security received the attention that it required. The need to do so was finally brought home by the 9/11 attack on the twin towers of the World Trade Center in Manhattan and on the Pentagon in Washington, DC. 9/11 introduced a new chapter in aviation security, for that disaster dramatically demonstrated the degree to which aviation could be exploited by terrorists to further their aims and forced not only the United States, but other countries as well, to focus on the numerous vulnerabilities that characterized the aviation system at that time. Since then enormous amounts of resources have been allocated throughout the globe in an effort to ensure that people and goods can be securely transported internationally.

Yet the attacks continue because of the attractiveness of the targets and the difficulties involved in safeguarding the aviation sector, including the terrorists' capabilities in circumventing the security measures that have been implemented. They have continually worked to develop new tactics as evidenced by their ever-changing modes of attack and choice of targets within the aviation system. Thus, attacks have ranged from a 'shoe bomber' seeking to destroy a plane to bombings of terminals. And, even as these words are being written, intelligence reports that terrorists are developing a new threat involving bombs that cannot be detected with existing technologies have led to the US decision to impose new

restrictions involving laptops on flights originating from certain countries. Nor can one minimize other very real potential threats including a cyber-attack on a range of possible targets to the use of drones or a missile. The ever-changing nature of the threat to aviation obviously requires continual adjustments on the part of security agencies and the adoption of proactive rather than reactive strategies.

The threat of a cyber-attack, which can originate anywhere, underlines another of the numerous difficulties in achieving aviation security, its global character. Since it is an international activity, no nation can ensure that its airlines and airports can be secure, regardless of the resources that it devotes to this effort. Even if a country develops, funds, and implements effective national policies, a high percentage of arrivals (people and freight) originate elsewhere so that a failure to effectively screen passengers, baggage, and cargo at the point of origin or at stops along the way can profoundly impact that country's aviation sector. The Lockerbie massacre tragically demonstrated this vulnerability, for the flight to New York originated in Frankfurt and involved a change of planes in London. The bomb that destroyed the plane had been placed in a Samsonite suitcase and interline luggage security proved to be tragically inadequate.

Accordingly, regional and international coordination is essential, and an entire body of international air law has emerged as well as numerous regional agreements designed to overcome the limits that the functioning of this sector imposed on individual countries. By World War II, the dramatic growth and technological developments that had taken place in previous decades led to a widespread understanding that an international agreement regulating many aspects of aviation was necessary. Accordingly, in 1944, a meeting was held in Chicago that produced a Convention on Civil Aviation (the Chicago Convention) that was signed by 52 countries. That landmark treaty established the International Civil Aviation Organization (ICAO), which became a specialized UN agency in 1947. Though security was not an important agenda item at that time, it subsequently became a major area of concern, beginning in 1963 with the Tokyo Convention. Today, it plays a major role in organizing international efforts to safeguard aviation, for each member is required to establish a security organization that develops and implements a specific program to secure its airports and airlines. Reaching agreements on such topics and ensuring that states implement them effectively, however, is obviously a challenging task given the variety of states involved, their differing characteristics, policies and capabilities.

Nevertheless, the importance of overcoming such obstacles and achieving multinational cooperation is widely accepted given the nature and

goals of the organizations that pose the greatest threat to aviation security today – al-Qaeda and the Islamic State (ISIS). Al-Qaeda is, of course, responsible for the new era in aviation security, which was inaugurated by its deadly 9/11 attacks on the World Trade Center and the Pentagon. Though its power and influence apparently diminished following the death of Osama Bin Laden in 2011, it has recently experienced a resurgence that is likely to continue. Even if that does not occur, it still retains the ability and interest in attacking aviation facilities in many countries.

ISIS, unlike al-Qaeda, sought to establish its rule over a geographic area but it has lost almost 60 percent of the territory it controlled in Iraq and Syria in the last few years and remains under severe pressure. Though it will probably lose much more territory, it has demonstrated its ability to use the internet to recruit men and women in many countries who, whether for a shared religious orientation, support for its goals, or personal reasons, are willing to engage in terrorist plots. Thus, regardless of what happens on the ground, ISIS will doubtless be able to continue to attract adherents and to organize terrorist attacks. Accordingly, it too must be considered a continuing terrorist threat, one which has been and will continue to be directed to aviation.

Furthermore, given the growing competition between ISIS and al-Qaeda for global support and resources from the multinational jihadi community, the threat to aviation is likely to increase in the years to come. And, other groups and organizations may well follow their example. How widely aviation continues to be regarded as an attractive target was recently vividly illustrated by the comments made, on February 1, 2017, by a Palestinian leader, Fatah Central Committee member and former Palestinian negotiator Nabil Shaath. After condemning Europe for its lack of concern for the fate of the Syrian people and noting that the terror attacks had led to action, he stated: ‘Do we have to hijack your planes and destroy your airports again to make you care about our cause?’<sup>1</sup>

Clearly, the state of global aviation security requires continuing attention. In this work, distinguished scholars explore the structure and functioning of this global system and the evolution and current state of the security arrangements that have been implemented in many countries. Thus, Part I consists of a discussion of the various domestic and external factors that have influenced the organization and functioning of the aviation sector. The goal of this section is to identify the context within which security issues are defined, agendas established, decisions made, policy formulated, and resources allocated. Furthermore, the strengths and weaknesses of this structure and its functioning are also identified and discussed including an analysis of the unique characteristics of air cargo and their implications for security.

Chapter 2, 'The policy dimensions of air transport security' by Joseph S. Szyliowicz, examines the public policy dimensions that impact aviation and the security issues involved. These can be considered at three levels: the national, the international, and the regional. Essentially, the policy adopted by a state can be analyzed along two dimensions, the particular issue area and the policy instrument that is applied. Thus, the choices that states make in defining and prioritizing their aviation issues and in selecting particular instruments will vary. Though all consider aviation security an important topic, the specific measures that are adopted depend upon such factors as international requirements, the nature of the political system, and relations with industry. Such considerations also influence developments at the international level, which has witnessed the growth and expansion of a large body of international agreements and conventions. Though these play an important role in safeguarding aviation, issues of application and implementation sometimes continue to pose difficult challenges. In order to overcome some of these, regional organizations, notably by the EU, have implemented policies designed to ensure that security standards are effectively developed and implemented within the region. Some states, notably the US have also adopted policies that seek to ensure that the aviation systems of other countries with whom they interact closely will be secure. Still, despite all these efforts, ensuring that the global aviation system functions in a secure manner remains a challenge.

Chapter 3, 'Economic issues in air transport security' by Luca Zamparini, aims at providing a brief review of the economics literature on air transport security by considering the various dimensions that have to be tackled in order to reach an optimal level of security procurement. The chapter will emphasize that it is important to consider that a good amount of security does not only benefit air passengers, freight forwarders, airlines and the other economic actors that are directly involved in the aviation industry. It also generates positive spillovers (externalities) in the overall economic system. The chapter will also discuss the assessment of risk in aviation security by determining that there are four types of societal risks that have to be considered in models dealing with this topic: perceived, real, statistical and predicted risk. It will then analyze two different models that have been proposed in order to estimate the net benefits that are determined by the adoption of air transport security measures. Lastly, it will discuss the models that assess airport security screening. This appears to be the topic that has attracted the largest share of the relevant literature.

Chapter 4, 'International and EU legal frameworks of aviation security' by Francesco Rossi Dal Pozzo, stresses the intrinsic international nature of air transport and travel and the consequent need to implement a common legal framework. The legal initiatives related to aviation security started

to emerge in the 1960s as an answer to the first wave of hijackings and were substantiated in the Tokyo Convention in 1963. Subsequent terrorist related hijackings led to The Hague and Montreal Conventions. The consequent regulations were changed in the decade following the tragic events of September 11, 2001 by enhancing the security protocols within the aircrafts and at the airports. Such measures should be commensurate with the risks that may be faced and should take into account cost-benefit ratio analyses. The Resolution A39-18 adopted by ICAO members during the 39th ICAO General Assembly in Montreal (September–October 2016) has consolidated the previous regulations and has started to consider cyber-attacks. The chapter then considers the EU regulations for aviation security since the September 11 events. It emphasizes that the first response led to regulations that were not easily implemented and that, in the ensuing years, several measures were aimed at increasing security levels and at homogenizing the protocols and procedures among countries. A further section of the chapter discusses passenger name records, which started as a commercial initiative and was converted to a security protocol in 2004.

Chapter 5 on ‘The role of the private sector for air transport security’, by Jeffrey C. Price, discusses various areas of air transport security that involve the private sector. Corporations are normally employed because they are supposedly able to bring a higher degree of efficiency to various tasks than government agencies. The first dimensions that the chapter considers are security screening technologies and personnel. Prior to September 11, security screening was managed by private firms. This was then questioned given that aviation security was deemed to represent a national security issue. Eventually, some airports in the US opted for Transport Security Administration (TSA) screening and others for private companies under the supervision of TSA. A close collaboration between private firms and public authorities has historically characterized the evolution of security screening technologies and apparels. The chapter also discusses access control, identity management and airport perimeter security; activities that are deployed by private security contractors. Especially important, in this context, are the perimeter intrusion detection systems aimed at preventing the access of unauthorized personnel onto the airfield. The chapter then discusses the aircraft operator security technology. Cockpit doors and secondary flight deck barrier protections, and their evolution over time, are two noteworthy examples. Finally, the intelligence dimension, including interdiction and research to prevent security related episodes, is considered.

Part I of the book closes with Chapter 6, ‘The challenge of air cargo security’ by Douglas Brittin. This branch of the aviation industry confronts unique challenges as the industry seeks to achieve a high level of protection

while maintaining good business practices. Air cargo is a vast and growing sector that transports a wide range of products, including some that are classified as ‘dangerous goods’, in a variety of different models, each of which presents its own security challenges. In each, numerous actors are involved, ranging from shippers to freight forwarders to the transportation companies. Security has always been a challenge to the industry because of criminal activities but in recent decades the terrorist threat has led to the development of new security processes and regulations, which, given the nature of the supply chains, require common global practices and objectives. Furthermore, these regulations extend well beyond merely screening at airports and involve a wide variety of programs, procedures and technologies. Achieving a high level of security in this environment requires the resolution of numerous complex operational issues. Safeguarding air cargo under these conditions requires, above all, close cooperation with regulators, and globally accepted standards and definitions.

Having established the general context which shapes global aviation and its security, we turn our attention, in Part II, to a number of country case studies drawn from several geographic regions (North America, South America, Europe, Asia, Africa and Australia). All these countries have confronted various problems in their efforts to establish effective security policies and practices as a result of their particular situations. Accordingly, this section has two goals. First, it seeks to identify communalities and differences in how states define security issues, establish agendas, make decisions, formulate policy and allocate resources. Second, it seeks to identify the strengths and weaknesses of the security structures that these states have established in order to draw comparative conclusions.

This section opens with Chapter 7, by Joseph S. Szyliowicz, which discusses the ‘Aviation security in the USA’. The US did not accord adequate attention to safeguarding its extensive aviation system prior to 9/11 but it then moved vigorously to confront the security challenge. It adopted various new policies, rules, and regulations that established a new structure and adopted policies that were designed to ensure that passengers could fly safely, that cargo would be secure and that general aviation facilities would also be adequately protected. As part of this effort, it has played an important role in attempting to ensure that its security standards applied beyond its borders. Nevertheless, the analysis reveals that despite all these efforts, all parts of its aviation system – passengers, cargo, and general aviation – still contain various shortcomings.

Chapter 8, by Kamaal Zaidi, considers ‘Aviation security policy in Canada’. He begins by noting the multilayered security matrix, made up of a network of laws, regulations, policies, measures, programs and technology that serve as the guiding framework for aviation security in

Canada. The importance of this multilayered security matrix emerges when one layer is breached and the others continue to serve as preventive barriers to avoid criminal attacks or interference with civil aviation. The chapter then lists all government and private entities involved in aviation security and their procedures and activities. The author then considers the various programs and measures that have been adopted for both passenger and cargo security along with the relevant laws, and the main purpose of each law. The chapter finally discusses the main trends that characterize the current evolution of aviation security: a) privacy and aviation security; b) the review of Canada's Transportation Act; c) the regulation of drones; and d) the right to protest in Canadian airports.

Chapter 9, by Dawna Rhoades and Michael J. Williams, turns its attention to a South American country and examines 'Safety and security in Brazilian aviation'. The chapter begins with a description of the Brazilian geography and population and a discussion of their importance for the design of safety and security measures. It then considers the air transportation sector in the key areas of airlines, airports, aircraft manufacturing, general aviation, air traffic management and aircraft maintenance and training. Brazilian airlines have been characterized, historically, by a high level of instability over time. Some airports suffer from overcrowding and the related flight delays and cancellations. General aviation plays an important role in Brazil, particularly for many destinations in the less developed interior of the country, which cannot be reached by surface transport, or only with difficulty. The chapter then discusses safety and security issues. In the latter case, both crimes against passengers and cargo thefts are considered. The difficulties of airport security due to the lack of investments in surveillance technology and of physical and electronic barriers are highlighted and a list of possible recommendations for the improvement of cargo and passenger security is then provided. The chapter ends with a description of the Civil Aviation National Agency, which is responsible for aviation regulation in Brazil.

Chapter 10, by Hillel Avihai, discusses 'Air transport security in Israel'. The chapter begins by considering the relevance of the terrorist hijacking in 1968 for the development of a very stringent aviation security strategy in Israel. It then lists and comments on the main security related episodes that have occurred since. Israeli security philosophy has, at its core, the necessity to identify potential terrorists, which it seeks to achieve by relying mainly on the detection of passengers' intentions. The chapter then lists the assumptions that characterize the multi-circle strategy adopted by the Israeli security officers and agencies. They emphasize the role of technology and of well-trained personnel and the importance of security over some inconvenience to passengers. The various circles of aviation

security are represented by the area around the aircraft, terminal security and preventing the aircraft from being used as a flying missile. In order to achieve this goal various measures in terms of security personnel, strengthened cockpit doors and cargo containers have been adopted. The chapter then considers the security procedures at Israel's airport, which have, as their aim, that no suspicious human or physical element should be able to overcome the security checks. This is accomplished by a profiling of passengers by trained personnel. The chapter concludes with a comparative analysis between the human and the technological elements that includes a discussion of their related advantages and disadvantages.

Chapter 11, 'Air transport security in Kenya' by Evaristus Irandu, provides a study related to an African country. It considers the relationship between air transport and the overall development of African countries and identifies security as one of the most relevant issues in this context. It then reports on the continually growing trend of air transport in Kenya and the quantity and quality of airports in the country. The chapter considers the procedures and protocols that characterize security in Kenyan airports and the agencies that are involved in these tasks. Air cargo security is also analyzed and the roles of the various public and private stakeholders involved are discussed. The author concludes that it is impossible to perform a full screening of all items. The chapter then lists and discusses other air transport security challenges faced by Kenya, including the location of airports, access control and airport perimeter fencing, security screening equipment and procedures, and the training of security personnel. The chapter finally considers the main strategies to enhance air transport security in Kenya, which include the need to implement ICAO standards, to cooperate with other East African Community members and to implement the Aviation Security (AVSEC) mechanism.

Chapter 12, 'Air transport security in Malaysia' by Priyanka Puri, Manjit Singh Sandhu and Santha Vaithlingam, focuses on a country that has suffered some of the worst episodes related to aviation security in the current decade. The chapter begins by stressing the relevance that the tragic events of 2014 have had on the perception of security by the Malaysian airline and by the general public. It also provides a quantitative estimate of the loss in income in the aftermath of these episodes. It then discusses the Malaysian civil aviation industry and provides a thorough analysis of the two episodes that occurred in 2014. The chapter then considers air transport security in Malaysia with special attention to the role, functions and organization of its governing body, the Department of Civil Aviation. It also considers the main challenges that the Department confronts including aircraft flight tracking and conflict zone risk mitigation. A thorough analysis of these topics is presented both in terms of risk

assessment and of possible strategies to minimize the threats they pose to a secure aviation system.

Chapter 13, by Toki Udagawa Hirakawa, entitled 'Air transport security in Japan' considers the situation in a second Asian country. The chapter begins with detailed descriptions of the three main aviation security related episodes that have involved Japan Airlines both domestically and at foreign airports/routes. These served to raise awareness of the importance of the issue of aviation security and the need for new measures. September 11 marked another turning point and led to the further strengthening of security related measures. Though these changes enhanced the level of security, the chapter continues by highlighting and describing the main problems that still need to be dealt with in order to further strengthen the Japanese aviation security system. These are related to voluntary security checks, to the imposition of expenses to private airlines, to the overall organizational structure of the aviation security system and to the balance between security and service. The chapter concludes by noting the importance of aviation security for the successful development of the 2020 Olympic and Paralympic games in Tokyo.

This second section concludes with Chapter 14, by Jeffrey Price, 'Aviation security in Australia'. It begins by emphasizing that the provision of aviation security is a challenging task in the country given the number of airports and the quantity of passengers and cargo. It then describes the situation that characterized aviation security before 2001, one that did not consider terrorism explicitly because of the widespread belief that Australia was not considered as an important target. Things dramatically changed after the September 11 events, for these led to a complete reconsideration of the aviation security structure and procedures in the country, including an immediate commitment for security upgrades that involved all domains of aviation. The chapter then discusses two subsequent security related episodes that raised doubts about the effectiveness of the measures that had been adopted. An external investigation and an inquiry that lasted three years resulted in a series of recommendations on how to further strengthen the Australian security system. The chapter ends with a description of the most recent events and with an analysis of the most controversial issues that prevail in Australian aviation security.

In the last chapter of the book, we turn our attention to a consideration of the issues that have emerged in the two previous sections of the book. We begin by identifying the significance of various contextual issues that have shaped aviation security policy and the general challenges that remain to be tackled at that level. We then turn our attention to a comparative analysis of the specific case studies in order to identify the similarities and differences in the policies that different states have adopted, the resources

they have allocated, and their effectiveness. We conclude with an analysis of the lessons that emerge and a consideration of what, if anything, can be done to enhance aviation security, nationally and globally given not only the known existing threats but those that loom on the horizon as well.

## NOTE

1. <https://www.memri.org/tv/nabil-shaath-int'l-peace-conference-anything-better-us-led-negotiations-do-we-need-hijack-planes>.

