AVIATION TERRORISM
Thwarting High-Impact Low-Probability Attacks

TERRORISME AÉRIEN
Contrecarrer des attaques improbables à impacts élevés

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by

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Abstract

Despite advances in security screening technology and the deployment of significant human and financial resources over the years, the civil aviation sector still remains vulnerable to terrorist attacks. This thesis examines the impact (if any) the international legal and regulatory framework has had on aviation terrorism. It also assesses its historical effectiveness in preventing or thwarting terrorist attacks against civil aviation.

In order to assess the impact that changes to the legal and regulatory framework have had on the ability of terrorists to plan and carry out attacks against civil aviation, the overall concepts of terrorism and aviation terrorism, as a particular tactic of terrorism, are explored. The thesis subsequently examines the evolution of the terrorist threat to civil aviation through an analysis of the author's exclusive database in order to fully understand its scope. Aviation terrorism statistics are then correlated to all ICAO security-related legal instruments, i.e. Conventions, Protocols, Resolutions, Standards and Recommended Practices (SARPs), which form the international legal and regulatory framework.

The analysis demonstrates that changes are made to the international civil aviation legal and regulatory framework in reaction to certain catalytic attacks in order to obtain a global civil aviation security network commensurate with new and evolving threats. But the analysis shows such measures are arbitrary for terrorists because they see no boundaries, only opportunities. For them, new legal and regulatory measures are a mere roadblock. This analysis demonstrates that, by exercising patience and creativity, terrorists have been able to surmount security roadblocks time and time again. This is specifically evident when examining catalytic terrorist attacks against civil aviation and the transitions from one successful Modus Operandi to the next.

This thesis demonstrates that changes to the international legal and regulatory framework have had an impact on preventing or deterring terrorist attacks against civil aviation. Statistics collected for this research show a steep decline in the number of occurrences since 2003. However, credit for this decline cannot be attributed to a single Convention or Protocol, but to an array of actions taken by the international community and the International Civil Aviation Organization over the last fifty years. Altogether, they appear to have made civil aviation increasingly secure.

Résumé

Le secteur de l'aviation civile reste vulnérable aux attaques terroristes malgré le fait que, depuis plusieurs années, des avancées technologiques ont été réalisées en sécurité aérienne et d'importantes ressources humaines et financières ont été déployées. L'objectif central de cette thèse consiste à examiner les paramètres juridiques et règlementaires internationaux à cet égard et à en évaluer l'efficacité historique en vue de prévenir et de contrecarrer les attaques de terrorisme aérien.

Afin de déterminer les répercussions que les changements au cadre juridique et règlementaire de l'aviation civile ont pu avoir sur les capacités des terroristes à planifier et à exécuter leurs attaques, cette thèse analyse les grands concepts du terrorisme et du terrorisme aérien, sous l'angle particulier des tactiques privilégiées pour causer la terreur. En outre, cette thèse s'intéresse à l'évolution de la menace terroriste en matière d'aviation civile en effectuant une analyse selon une base exclusive de données préparée par l'auteur et qui permettra d'en mesurer l'ampleur. Dans cette foulée, les statistiques obtenues sur le terrorisme aérien font l'objet d'une comparaison avec les instruments juridiques et règlementaires de l'Organisation de l'aviation civile internationale (OACI) reliés à la sureté du transport aérien (conventions, protocoles, normes et pratiques recommandées (SARP), résolutions) qui forment le cadre juridique et règlementaire international.

L'analyse démontre que les changements au cadre juridique et règlementaire international sont apportés en réaction à certaines attaques catalytiques dans le but d'établir un réseau sécuritaire à la hauteur des menaces nouvelles et changeantes contre l'aviation civile. Or, les analyses laissent voir que les terroristes considèrent ces mesures arbitraires puisque leur désir d'attaquer l'aviation civile ne connait ni frontières, seulement des occasions. À leurs yeux, ces mesures ne représentent que de simples obstacles. L'analyse fait également la démonstration que les terroristes, en misant sur la patience et l'ingéniosité, ont su surmonter ces obstacles de sécurité plus d'une fois. Cela devient d'une évidence claire lorsqu'on examine les attaques terroristes catalytiques contre l'aviation civile et les transitions que les terroristes réussissent à faire d'une méthode d'attaque à une autre.

Cette thèse illustre que les changements effectués au cadre juridique et règlementaire international ont eu des impacts sur la prévention et la dissuasion d'attaques terroristes contre l'aviation civile. Les statistiques recueillies lors de cette recherche révèlent d'ailleurs une baisse marquée du nombre d'attentats survenus depuis 2003. Toutefois, cette avancée ne résulte pas des effets d'une seule convention ou mesure, mais plutôt d'une série d'actions prises par la communauté internationale et l'OACI qui, depuis plus de 50 ans, ont façonné ensemble un environnement sans cesse plus sécuritaire pour le monde de l'aviation civile.

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Introduction

For more than 50 years, the International Civil Aviation Organization (ICAO) has developed a legal and regulatory framework (LRF) to stop a wave of criminal and terrorist assaults against aviation. This thesis concentrates its analysis solely on aviation terrorism. More specifically, this study examines the effectiveness of ICAO's legal instruments for thwarting aviation terrorism. Although terrorism is a phenomenon deeply rooted in history, aviation terrorism is relatively new as it is linked with the fast-paced expansion of civil aviation in the second half of the twentieth century. From the onset of the jet age, terrorists have tried, tested and improved various methods for attacking civil aviation. They initiated a *wave* of aviation terrorism with a series of aircraft hijackings in the 1960s, introduced a long *cycle* of airport and ground attacks in the 1970s, instigated a short but deadly mid-air sabotaging *stage* in the 1980s, and prompted a *phase* of suicide missions in the 1990s, which culminated in the 11 September 2001 (9/11) attacks that killed thousands of people with hijacked aircraft.[1] Thereafter, the 9/11 attacks solidified the will of the United Nations (UN) and ICAO Member States to fight aviation terrorism and transformed the way aviation security was done. It also forced a re-evaluation of aviation security systems in countries that had long believed in the superior security of its commercial aviation sector.[2] Boaz Ganor posits that the targets, damage, scope, and sophistication of the 9/11 attacks have all contributed to turning international terrorism into an immediate, tangible, and existential danger to the entire world.[3] The attacks were a rude awakening for ICAO as they showed the enduring vulnerability of civil aviation. Proceeding from this background, the thesis' first chapter establishes the aim of the study, specifies the problem to be examined, presents the background of the study, offers an overview of the methodology used, notes its limitations and delimitations, and describes the significance of the study.

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1. Audrey Kurth Cronin, "How al-Qaida Ends: The Decline and Demise of Terrorist groups," *International Security,* 31:1 (Summer 2006): 14-16. The four words in italics of this sentence are inspired by Cronin's concept of Cycles, Stages, Waves, and Phases.
2. Thomas A. Birkland, *Lessons of Disaster: Policy Change After Catastrophic Events* (Washington, DC: Georgetown University Press 2006), 62.
3. Boaz Ganor, *The Counter-Terrorism Puzzle: A Guide for Decision Makers* (New Brunswick, NJ: Transaction Publishers, 2005), xv.

1.1   Aim of the Study

The aim of the current study is to determine if ICAO's international legal and regulatory framework (LRF) had any impact on aviation terrorism. To fulfil this aim, a two-pronged analytical process was used: (1) the first probed data gathered in the Aviation Terrorism Sub-Database (ATSD) for the period covering the first civil aviation terrorist attack on 21 February 1931 until 31 December 2011, and (2) the second analyzed ICAO legal, operational, and administrative documents developed to prevent and thwart aviation terrorism. The idea of placing changes to the LRF in time and looking at their possible statistical effects on aviation terrorism was highly pertinent. In fact, this data comparison fully encapsulated the "quantifying exercise" prescribed by the research question.

1.2   The Problem: Question and Hypothesis

To the best of the author's knowledge, there is currently no empirical research that measures the effect of the legal and regulatory framework (LRF) on aviation terrorism. In order to explore this unchartered territory, the research question was posed as follows: *What impact, if any, has the international civil aviation legal and regulatory framework had on aviation terrorism*? The way the question is formulated addresses both the problem (aviation terrorism) and the response given by authorities to tackle the problem (the LRF). The concern (ICAO's allegedly reactive mode), the third identified factor, is exposed in the hypothesized answer.

Faced with this research question, the initial hypothesis of this dissertation was that ICAO demonstrated a reactive approach to civil aviation terrorism, both objectively (that is, it only made changes to the LRF after, and in reaction to, terrorist attacks) and subjectively (that is, it failed to act proactively and was in this sense reactive). The initial hypothesis was that aviation terrorists drove the action and reaction process that forms the evolution of civil aviation terrorism responses. As will be discussed in much more detail later in this dissertation, after the research was completed this hypothesis had to be modified. Based on the available evidence, it appeared that it was not ICAO that was reactive, but rather it was the Member States, through their failure to implement ICAO's work, that were responsible for ceding the initiative to civil aviation terrorists. Returning to the initial hypothesis, while the author assumed it to be correct, three negative side effects of the hypothetically reactive mode of ICAO on the LRF were noted. These were that it: (1) undermines the confidence of the traveling public in the safety of civil aviation,[4] (2) encourages terrorists to innovate,[5] and (3) displaces the

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4. ICAO, *Convention for the Suppression of Unlawful Seizure of Aircraft* (The Hague, 1970), Preamble; *Convention for the Suppression of Unlawful Acts against the Safety of Civil Aviation* (Montréal, 1971), Preamble; *Protocol for the Suppression of Unlawful Acts of Violence at Airports Serving International Civil Aviation* (Montréal, 1988), Introduction;

terrorists' capacity onto other targets.[6] As will be discussed in more detail later, this dissertation found that the confidence of the traveling public was *not* undermined by terrorist attacks against civil aviation, that terrorists *did* continuously innovate, and that terrorists did *not* displace their capacity for terrorism from aviation onto other targets (at least, not entirely).

Ronald Clarke and Graeme Newman, two of the most prominent authors on situational crime prevention (SCP), have studied the last side effect. They assert that SCP techniques are applicable to terrorism. On the other hand, they contend that crime displacement is unlikely to occur. They specifically argue that the techniques used to curb hijackings in the 1970s succeeded and did not generate displacement.[7] In a more recent study, Henda Yao Hsu reached the same conclusions: "situational measures significantly reduced the intended attacks, but did not result in the immediate and inevitable displacement of terrorism."[8] The SCP and displacement theory in a context of aviation terrorism as exposed by the hypothesis and its three consequences will be discussed further in chapter 5.

1.3 Background of the Study

It might be useful at this stage to briefly describe the context in which the decision was made to initiate this research. The study was conducted at a time when: (1) the public regularly doubted the pertinence of security measures built around civil aviation,[9] (2) governments were repeatedly questioned about the high costs of aviation security,[10] (3) an intellectual movement adamantly criticized the "smoke and mirror" approach to aviation security,[11] and (4) many believed the authorities

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Convention on the Suppression of Unlawful Acts Relating to International Civil Aviation (Beijing, 2010). Preamble.

5. Adam Dolnik, *Understanding Terrorist Innovation: Technology, Tactics and Global Trends* (New York: Routledge, 2007), 15, 174.

6. Bruce Schneier, "Airline Security: A Waste of Money and Time," *Schneier on Security* (newsletter), 15 December 2010, http://www.schneier.com. The "displacement theory" was developed in the 1970s.

7. Ronald V. Clarke and Graeme R. Newman, *Outsmarting The Terrorists* (Westport, CT: Praeger, 2006), 41-52.

8. Henda Yao Hsu, "Unstoppable? A Close Look at Terrorism Displacement," (PhD diss., University at Albany, State University of New York, 2011), 96.

9. Eben Kaplan, "Targets for Terrorists: post 9/11 Aviation Security," *Council on Foreign Relations* (7 September 2006), http://www.cfr.org.

10. Dan Milmo, "After 9/11: airports 'wasting billions' on needless security checks for passengers," *Guardian* (7 September 2011), http://www.theguardian.com.

11. Here are the most vocal critics of aviation security measures adopted post-9/11: Bruce Schneier, *Beyond Fear: Thinking Sensibly About Security in an Uncertain* World (New York: Copernicus, 2003); Andrew R. Thomas, *Aviation Insecurity: The New Challenges of the Air Travel* (Amherst, NY: Prometheus, 2003); Frank P. Harvey, *Smoke & Mirrors: Globalized Terrorism and the Illusion of Multilateral Security* (Toronto: University of

were constantly fighting the last war.[12] In order to better grasp the environment in which aviation terrorism occurs, four major aspects were examined: (1) the history of civil aviation, (2) the evolution of civil aviation terrorism, (3) the development of the civil aviation's international legal and regulatory framework (LRF), and (4) the alleged reactive mode of ICAO, and the negative consequences of this for the fight against civil aviation terrorism, asserted in the initial hypothesis.

1.3.1 Civil Aviation

Although it brought great assistance to the free and growing movement of people and goods, the emergence of aviation also generated several unanticipated problems. Note here that aviation was initially developed on a massive scale in a military context, and thus the initial positive and negative aspects of the industry appeared in that military context. For example, in the field of warfare, the early use of airplanes in World War I enabled the collection of intelligence, while the inclusion of fighter and bomber planes in World War II enabled military attacks of unparalleled lethality. Nevertheless, these military advantages were short-lived, as every country eventually acquired its own air force. Civil aviation underwent similarly rapid developments. In just over one hundred years, aviation has gone from tiny prototype airplanes to full-scale aircraft carrying nearly three billion passengers every year.[13] In 2014, over three billion people were transported, and the aviation industry generated a business activity estimated at US$ 2.4 trillion (including direct, indirect and the catalytic impact on tourism).[14] According to ICAO's forecasts, world air traffic should grow about 4.6 percent per annum during the 2005-2025 period.[15]

Such data show that civil aviation has allowed an unprecedented level of mobility, facilitating travel to the most remote parts of the world within hours rather than months. However, this greater mobility presents a weakness. An aircraft is a compact vehicle filled with a lot of people, making it critically susceptible to becoming a target of interest for terrorists. In this context, managing such a fragile industry is a delicate operation in which three main types of actors play a crucial role: (1) sovereign states, whose laws and regulations lay the foundations for the industry; (2) intergovernmental organizations (e.g., ICAO), mandated by sovereign states to fulfill particular tasks in the development of civil aviation; and (3) airline

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Toronto Press, 2004); John Mueller, *Overblown: How Politicians and the Terrorism Industry Inflate National Security Threats, and Why We Believe Them* (New York, Free Press, 2006).

12. R. William Johnstone, *9/11 and the Future of Transportation Security* (Westport, CT, Praeger, 2006), 26.

13. *See* Appendix A, *World Passenger Traffic: 1929-2012*.

14. IATA, "Annual Report 2014," 6, http://www.iata.org.

15. ICAO, "Outlook for Air Transport to the Year 2025," (September 2007), Cir 313, AT/134, 34. *See also* Appendix A.

organizations, such as the International Air Transport Association (IATA), which is the trade association for the world's airlines.[16]

1.3.2 Civil Aviation Terrorism

In the first part of the wave of aviation terrorism in the late 1960s, terrorists were confident that attacks against civil aviation did more than just create havoc—it also attracted a lot of media attention to their cause. This vicious circle of perpetrating more attacks to obtain more media coverage escalated. Terrorist groups killed and terrorized masses of people by attacking on the ground, from the ground, and in the air. George Habash, leader of the PFLP once said: "to kill a Jew far from the battlefield has more effect than killing 100 of them in battle; it attracts more attention."[17]

In order to grasp the magnitude of the problem of aviation terrorism, the author of this dissertation has done extensive research to collect data on every act of unlawful interference against civil aviation (criminal incident or terrorist attack) since 1931. The specifics of 1965 occurrences were collected in the *Global Aviation Criminal Incidents Database* (GACID), an original database created for the purpose of this dissertation. The particulars of 586 *terrorist* attacks against civil aviation were then separated out and used to create a second, equally original database, called the *Aviation Terrorism Sub-Database* (ATSD).[18] Previous to this dissertation, no comparable databases on criminal incidents or terrorist attacks against civil aviation existed. These databases in themselves constitute a considerable contribution to the fields of terrorism studies, aviation terrorism studies, and aviation security. Statistics were generated based on the information contained in both databases, and will be referred to and interpreted throughout this dissertation. These statistics confirm that civil aviation has been an attractive target to terrorists for decades.

1.3.3 Civil Aviation Legal and Regulatory Framework

Legal instruments and regulations have played an essential role in allowing and accelerating the development and globalization of civil aviation. In the specific context of aviation security, the International Legal and Regulatory Framework (LRF) helped lead the fight against aviation terrorism through a two-component legislative process: law-making and regulations.[19] Both the legal and regulatory

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16. Adrianus D. Groenewege, *The Compendium of International Civil Aviation*, 3rd ed. (Montréal: International Aviation Development, 2003), 52.
17. Daniel Byman, *A High Price: The Triumphs and Failures of Israeli Counter-Terrorism* (New York, Oxford University Press, 2011), 44.
18. *See* Appendix B, *List of 586 Terrorist Attacks Against Civil Aviation: 1931-2011*.
19. ICAO, "Manual on the Regulation of International Air Transport" (Doc. 9626), 2nd ed. 2004, 1.1-1.

parts of the framework define common principles governing the development and improvement of civil aviation security. Being parties to the Chicago Convention 1944, all Member States must achieve compliance with the requirements of ICAO. They must assert that they adhere and implement standards set forth by ICAO.

As will be discussed in chapter 4, the law-making element of the LRF takes into account the Chicago *Convention on International Civil Aviation* 1944, which created ICAO, as well as all seven subsequent Conventions and Protocols related to aviation security adopted thereafter. The basic foundation of the framework lies in domestic laws required by the Chicago Convention 1944.[20] As Dempsey explains, laws establish the perimeters of acceptable conduct and are a means of substituting order for chaos in social relations.[21] As far as civil aviation is concerned, the main objective of these laws is to create a level of standardization for the safe and orderly conduct of international air transport services.[22] Suffice to say that law-making is infrequently exploited at ICAO because, once enacted, laws are only typically amended to respond to global issues. The regulatory component of the LRF is a subset of the legal element and refers to policy-making and the writing of tangible rules and regulations that support the application of laws. From an ICAO perspective, those rules correspond to Standards and Recommended Practices (SARPs) or Standards and Recommended Practices for Security (SARPS) progressively incorporated in the Chicago Convention 1944 through its Annex 17, which was first introduced in 1974. In contrast to the law-making component, the process of writing or amending regulations is rapid and is used more frequently.[23] As Abeyratne explains, regulations need to be kept current and responsive to changing situations and the needs of states and aviation stakeholders.[24]

The literature review shows that incremental changes have been made to the international LRF in the last half-century in order to prevent and thwart terrorist attacks against civil aviation. Likewise, new security measures were also adopted at a national level when countries had to respond to emerging threats.[25] Bearing in mind that attacks against civil aviation are a threat to world peace and security,

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20. Chicago Convention 1944, art. 37 states that "each contracting State must collaborate in securing the highest practicable degree of uniformity in regulations, standards, procedures, and organization in relation to aircraft, personnel, airways and auxiliary service…" It is with the integration of this article in domestic laws and its appropriate implementation that a safer international civil aviation will be achieved.

21. Paul Stephen Dempsey, *Public International Air Law* (Montréal, McGill University, 2008), 1.

22. Chicago Convention 1944, Preamble.

23. ICAO, "Manual on Regulation," 2004, 1.1-1.

24. Ruwantissa Abeyratne, *Regulation of Air Transport: The Slumbering Sentinels* (New York: Springer, 2013), 50.

25. For example, Israel introduced the concept of air marshals in 1968; in 1973, many western countries introduced metal detectors at passenger screening checkpoints of airports for intercepting any concealed weapons.

Malcolm Shaw, an authority in international law, describes a twin-track legal approach adopted by the UN when (1) dealing with particular manifestations of terrorist activity (aviation terrorism being one of them), and (2) condemning the phenomenon in general terms.[26] This demonstrates that ICAO was not alone in the international fight against civil aviation terrorism. Ben Saul creates a link between the UN and ICAO as he discusses the 17 international treaties adopted by both organizations between 1963 and 2005 in reaction to particularly egregious terrorist attacks; he further posits that some "were adopted to fill normative gaps in regulations which were spread across multiple jurisdictions and in relation to which the ordinary principle of territorial jurisdiction was insufficient."[27] Ben Saul's work thus further supports the author's argument that ICAO was not working in isolation, that it was working cooperatively with international mechanisms to respond to the ongoing threats to aviation. This international cooperation reached a new level in the 1990s. As Rodney Wallis explains, the unacceptability of unlawful acts committed against civil aviation in the early 1990s was actually addressed at the international level by the adoption of civil aviation treaties.[28] Paul Dempsey made clear that under the aegis of ICAO "international law, aimed at subduing threats and attacks on aviation and airport security, is based upon several multilateral conventions."[29]

Figure 1.1 shows that, beginning in 1963, a series of Conventions, Protocols, and other security measures were adopted under the aegis of ICAO. The objective of these measures was to criminalize the acts of those attacking civil aviation using ground attacks, hijackings, sabotage, and suicide missions. O'Donnell suggests that ICAO's legal instruments enabled the establishment of a sort of code of terrorist offences.[30] Moreover, expanding beyond the aviation security perspective, two other ICAO conventions addressing the civil liability matter were adopted. However, this research did not consider the two conventions as they only refer to legal liabilities, which is not the topic of this research.[31] Moreover, ICAO has also adopted a new protocol addressing disruptive passengers in 2014. However, this

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26. Malcolm N. Shaw, *International Law,* 6th ed. (Cambridge: Cambridge University Press, 2008), 1159-1160.
27. Ben Saul, *Defining Terrorism in International Law* (New York: Oxford University Press, 2008), 130-131.
28. Rodney Wallis, *Combating Air Terrorism* (New York: Brassey's: 1993), xix.
29. Dempsey, *Air Law*, 5, 233.
30. Daniel O'Donnell, "International treaties against terrorism and the use of terrorism during armed conflict and by armed forces," *International Review of the Red Cross* 88:864 (December 2006), 855.
31. ICAO, *Convention on Compensating for Damage Caused by Aircraft to Third Parties* (General Risk Convention) (2009); *Convention on Compensation for Damage to Third Parties, Resulting from Acts of Unlawful Interference Involving Aircraft* (Unlawful Interference Convention) (2009).

protocol was not considered in this research as it covers a period ending on 31 December 2011.
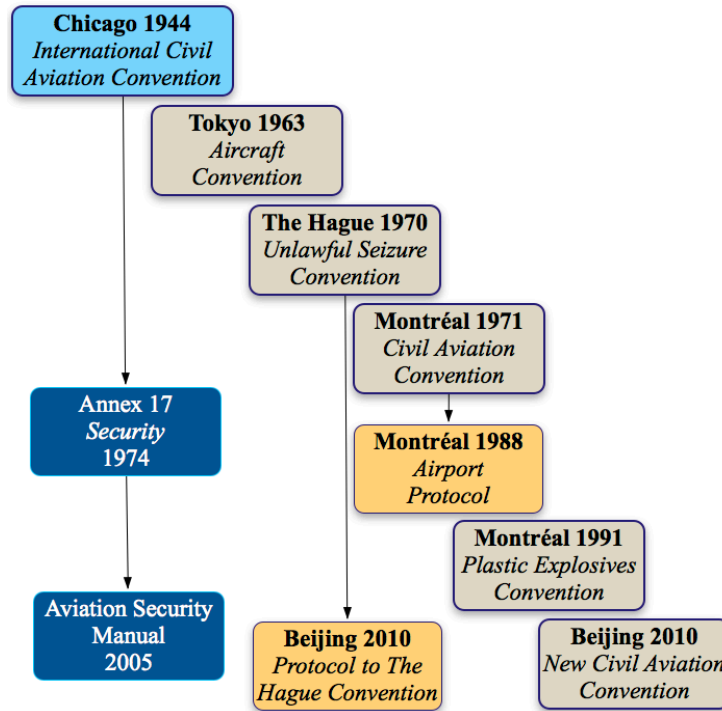
FIGURE 1.1   ICAO's Aviation Security Legal and Regulatory Framework

Building on this insight, this dissertation includes extensive analysis of key multilateral conventions relating to aviation terrorism (*see* chapter 4). From a civil aviation viewpoint, Ruwantissa Abeyratne finds it important to "discuss the various steps taken from a regulatory perspective by ICAO in its role as regulator and mentor of international civil aviation in countering imminent threats posed to the sustainability of the air transport industry."[32]   This is, essentially, the purpose of this dissertation.

All the authors quoted in the above paragraph demonstrate the international dimension of civil aviation and highlight that both the UN and ICAO played a central role in developing multilateral legal instruments to thwart aviation terrorism. Establishing the foundation of the LRF examined in this research is of great importance since it is also the inspiration for Member States in setting up

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32. Ruwantissa Abeyratne, *Aviation Security Law* (New York: Springer, 2010), 2.

their own civil aviation standard operating procedures based on SARPs.[33] As will be discussed in chapter 4, international treaties and national laws form the basis on which the global legal aviation security web operates nowadays.

1.3.4 ICAO's Allegedly Reactive Mode

Many of ICAO's critics have suggested that the organization has had a tendency to respond reactively to terrorist attacks. However, some of these attacks were more devastating than others. Several of these devastating attacks became catalytic events because of the impact they had as opposed to the way they unfolded or the number of victims they claimed. In such circumstances, Birkland calls them *focusing events* in the sense that they are sudden, relatively rare, and harmful. His description is particularly pertinent for the present research because he also suggests that when concentrated in a community of interest (i.e., civil aviation) and when the event is known to policy makers and the public virtually simultaneously (through mass media coverage of civil aviation terrorist attacks), such an event become a game-changer.[34] Johnston concurs and explains that, when applied to the transportation sector, an event is considered "catalytic" when it generates important policy changes.[35] Thus, the term "catalytic attack" will be used in the present research to refer to sudden, rare, and harmful attack generating policy changes in civil aviation. Catalytic attacks will be further explained and put in their proper statistical context in section 3.4.5 below.

The following examples demonstrate that ICAO legal instruments were indeed introduced in reaction to catalytic terrorist attacks: (1) the hijacking of El Al Flight 426 on 23 July 1968 brought about the long-awaited ratification of the 1963 Tokyo *Convention on Offences and Certain Other Acts Committed on Board Aircraft* as well as the quick adoption of The Hague *Convention for the Suppression of Unlawful Seizure of Aircraft* in 1970, (2) a series of five hijackings perpetrated by the Popular Front for the Liberation of Palestine (PFLP) between 6 to 9 September 1970 (an operation dubbed *Skyjack Sunday*) led to the adoption of the 1971 Montréal *Convention for the Suppression of Unlawful Acts against the Safety of Civil Aviation,* (3) the simultaneous Rome and Vienna airports terrorist attacks committed on 27 December 1985 led to the adoption in 1988 of the Montréal *Protocol for the Suppression of Unlawful Acts of Violence at Airports Serving International Civil Aviation*, and (4) three sabotage attacks eventually

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33. As of 29 April 2015, the UN has 193 Member States as opposed to the ICAO's 191. Three UN Member States are not members of ICAO: Dominica, Liechtenstein, and Tuvalu, whereas Cook Islands is an ICAO Member State and not a UN member.
34. Thomas A. Birkland, *After Disaster: Agenda Setting, Public Policy, and Focusing Events* (Washington D.C.: Georgetown University Press, 1997), 22.
35. Van R. Johnston, "Terrorism and Transportation Policy and Administration: Balancing the Model and Equations for Optimal Security," *Review of Policy Research*, 21:3 (2004): 263-274.

steered ICAO in 1991 to the adoption of the Montréal *Convention on the Marking of Plastic Explosives for the Purpose of Detection*: (a) Air India Flight 182 on 23 June 1985, (b) Pan Am Flight 103 on 22 December 1988, and (c) UTA Flight 772 on 19 September 1989. In a four-year span, a total of 770 people were killed by those three acts of sabotage.

Given that there have been so many catalytic attacks, one may wonder why ICAO always seemed to be caught off guard by terrorist attacks and to react with the introduction of new treaties. Ariel Merari, for example, notes critically that:

> The security system was caught by surprise when an airliner was first hijacked for political extortion; it was unprepared when an airliner was attacked on the tarmac by a terrorist team firing automatic weapons; when terrorists, who arrived as passengers, collected their luggage from the conveyer belt, took out weapons from their suitcases, and strafed the crowd in the arrival's hall; when a parcel bomb sent by mail exploded in an airliner's cargo hold in mid-flight; when a bomb was brought on board by an unwitting passenger, and so on.[36]

Merari's quotation reproduces the general perception that ICAO has always reacted to terrorist attacks. However, the depiction of ICAO as a reactive body does not accurately reflect the reality, but then again perpetuates the myth that the organization is continuously *fighting the last war.* Nonetheless, Merari's overgeneralization[37] sets the ground for testing the present research's hypothesis. Indeed, his viewpoint offers an angle from which the LRF is examined throughout this study.

In summary, the four major aspects discussed in section 1.3 (above) allowed for the identification of three factors that are the foundation of the present research: (1) a *Problem*, (2) a *Response*, and (3) a *Concern.* Furthermore, it is the argument of this dissertation that the interaction of these three factors produces instability in the industry by (1) yielding undesirable economic consequences for civil aviation, (2) creating fear of flying or, at the very least, raising a feeling of uncertainty in the traveling public, and (3) aggravating the perception that authorities always react to terrorist attacks instead of being proactive.

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36. Ariel Merari, "Attacks on Civil Aviation: Trends and Lessons," chap. 2 in *Aviation Terrorism and Security*, eds Paul Wilkinson and Brian M. Jenkins (London: Frank Cass, 1999), 24. *See also* Jin-Tai Choi, *Aviation Terrorism*: *Historical Survey, Perspectives and Responses* (New York: St. Martin, 1994).

37. W. Lawrence Neuman, *Social Research Methods: Qualitative and Quantitative Approaches,* 6 ed. (Montréal, Pearson, 2006), 5. Neuman defines *overgeneralization* as a statement that goes far beyond what can be justified based on the data or empirical observations that one has.

1.4 Overview, of Methodology

The present study is, in fact, an evaluation research aimed at finding out if the LRF has had an impact on aviation terrorism. Five approaches were required to conduct the present study, empirically test the hypothesis, and answer the research question. The approaches are conceptual, deductive, inductive, quantitative, and qualitative. Except for the conceptual and quantitative approaches that used a predetermined sequence and steps, the other parts of the process were not linear but flowed in several directions before the response to the research question could be found. Along the way, new factual information was gathered, verified and put in context.

At the conceptual level, a three-variable relationship clarifies the chain of causality and shows that the measurement process links together the three variables, moving deductively from the abstract to the concrete. In this research, what the author calls the *Problem-Response-Concern* equation expresses variables and the relationships among them in abstract terms. For instance, aviation terrorism (the *problem*) acts as the dependent variable, the international legal and regulatory framework (the *response*) as the independent one, while ICAO's reaction mode (*the concern*) acts as the intervening variable. For its part, the world of civil aviation dictates the global context in which the effect of the three variables must be tested.

Table 1.1 (below) builds on this and displays the path to answering the research question. First, it presents the three seeds at the origin of this research (*what* are the two main issues and *why* is there a concern). Then, it offers the three-faceted methodology needed for the study (*how* will the information be extracted, quantitatively and qualitatively, and *when* did events happened). Finally, it specifies the three main sources feeding the necessary material for the research (*where* are the main streams of information coming from and *who* are the authors supporting the arguments).

TABLE 1.1   Seeds, Needs, and Feeds

Seeds		Needs		Feeds	
Topics of Research		*Methodology*		*Sources of Information*	
What	*Problem*: Aviation Terrorism (dependent variable)	How	Quantitative	Where	GACID/ATSD
	Response: LRF (independent variable)		Qualitative		ICAO documents
Why	*Concern*: Reaction Mode (intervening variable)	When	Timeline	Who	Literature Review

Although circumstantial deductions have been used in the past to demonstrate the correlation between changes to the LRF and the number of terrorist attacks against civil aviation, no study has ever convincingly tested this correlation in an empirical manner. This appeared to be a major flaw in the scholarship given the huge human and financial resources dedicated to aviation security. The notion of

"impact" brought by changes to the LRF played a crucial role in the preparation of the research question and, therefore, necessitated measurement. In order to rectify this, three tools were essential: (1) Global and Modus Operandi specific statistics on aviation Terrorism, (2) an analysis of ICAO documents (legal, operational, and administrative) leading to changes to the LRF, and (3) time-specific analyses of the LRF and its impacts (if any) on aviation terrorism.

The next steps of this research project were done in a very inductive manner by observing the empirical civil aviation world and attempting to transpose policy-oriented schemes into academic models. Data was gathered from a variety of sources. After a thorough analysis, it became apparent that the scarce literature on aviation terrorism was insufficient to empirically identify and discuss actual effects the LRF has had on aviation terrorism. This problem became even more evident after consulting Schmid's cutting-edge research on terrorism.[38] Indeed, with the exception of references to certain specific aviation terrorism attacks, this seminal book was practically mute on the tactic of aviation terrorism, not to mention its legal and regulatory framework. Thus, a more extensive literature review was performed and its results suggested that a deductive approach would be more appropriate.

As chapter 3 demonstrates, quantitative work using ATSD statistics allowed for the depiction of a global picture of aviation terrorism and its MO. These statistics were very carefully collected, verified, and analyzed. The information gathered aim at explaining terrorist attacks, understanding aviation terrorism trends, and evaluating the effectiveness of civil aviation security measures.

Chapter 4 presents a qualitative analysis evaluating all security-related Conventions, Protocols, Annex 17, Resolutions, and Working Papers developed by ICAO since its inception in 1946. Chapter 4 also used both quantitative and qualitative sets of data in a time-specific analysis in order to assess the decision-making process leading to the current LRF. For instance, either direct or circumstantial evidence can provide a response. In the case of aviation terrorism, direct evidence could be obtained by interviewing terrorists. However, while such evidence could be straightforward, it would not help answering the question.

In short, this thesis' methodology is built around the conceptual PRC equation. A measurement process links together the variables of the equation, which is tested with a quantitative analysis (statistics) itself enhanced with qualitative strata (legal instruments). Statistics are generated based on descriptions extracted from seven different lists of aviation terrorist attacks, while elements of the LRF are collected, explained and listed to complement the series of information. Finally, this information is gathered in figures and timelines to facilitate their analysis.

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38. Alex P. Schmid, ed., *The Routledge Handbook of Terrorism Research* (New York: Routledge, 2011).

1.4.1   Global- and MO- Specific Statistics on Aviation Terrorism

The first action taken towards meeting the aviation terrorism statistical requirement was to obtain global- and MO-specific statistics on aviation terrorism suitable to the needs of this research. More specifically, a search was done to find any lists of terrorist attacks against civil aviation from which statistics could be generated. Two such lists were found: the first on a website called Skyjack,[39] maintained by Hillel Avihai, an Israeli academic specializing in aviation terrorism; the second in the work of Mary F. Schiavo, former Inspector General of the United States Department of Transportation (DOT).[40] While both lists appeared credible on the surface, a fundamental flaw was revealed during a cross-analysis. The content of each database differed greatly in terms of quantity of terrorist attacks. Avihai's included 198 attacks, whereas Schiavo's listed 1338. Looking further at the contents of each list revealed that Avihai's list was dedicated solely to politically-motivated attacks, mostly perpetrated by terrorist groups, whereas Schiavo's included both politically- and criminally-motivated incidents. Additionally, Schiavo's list included politically motivated attacks that were not included in Avihai's, and vice versa.

This is why further research was conducted to find possible alternatives to those two lists. Five more lists or databases focusing in part or entirely on aviation terrorism were found. The cross-analysis of the seven lists revealed the same problems: major discrepancies in terms of content, as well as a lack of focus on genuinely politically motivated terrorist attacks against civil aviation. (These additional lists are (1) Aviation Safety Network,[41] (2) RAND Database of Worldwide Terrorism Incidents,[42] (3) *Flights of Terror: Aerial hijacking and sabotage since 1930,*[43] (4) Global Terrorism Database,[44] and (5) *Skyjack: The Story of Air Piracy*.[45])

From then on, it was deemed necessary to build a new database on aviation terrorism based on the seven aforementioned lists, since each of those lists were deemed incomplete and most of them lacked focus on actual aviation terrorist attacks. Their amalgamation and consolidation was a logical step towards resolving the aforementioned issues.

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39. Skyjack Database, http://www.skyjack.co.il/chronology.htm.
40. Mary F. Schiavo, "Chronology of Attacks against Civil Aviation," chap. 10 in *Aviation Security Management,* vol. 1, *The Context of Aviation Security Management*, ed. Andrew R. Thomas (Westport, CT: Praeger, 2008).
41. Aviation Safety Net Database, http://aviation-safety.net/database/.
42. RAND Database of Worldwide Terrorism Incidents, http://www.smapp.rand.org.
43. David Gero, *Flights of Terror: Aerial hijack and sabotage since 1930*, 2nd ed. (Sparkford, UK: Haynes, 2009).
44. Global Terrorism Database, http://www.start.umd.edu/gtd/.
45. David Phillips, *Skyjack: The Story of Air Piracy* (London: Harrap, 1973).

1.4.2 ICAO Documents Leading to Changes to the LRF

The various components of the legal and regulatory framework are generally discussed in legal books on international air laws. While it would normally be appropriate and easier to use the comments already provided by legal experts on the subject matter, it was decided that in order to address rigorously and specifically the needs of the present research, analyzing publicly available LRF documents was deemed essential. However, an examination of ICAO database revealed that no such composite list exist, nor does a unified timeline bringing together all security-related information (i.e., Conventions, Protocols, aviation security documents, and ICAO Assembly Resolutions and Working Papers). Such a list and timeline are fundamental for cross-referencing data with ATSD. Only by having aviation terrorism statistics and ICAO legal instruments in the same timeline would it be possible to appreciate the impact of terrorist actions and ICAO's reactions and vice versa. Thus, the author created such a composite timeline, previously non-existent in academic literature. This timeline represents an original contribution to research on aviation terrorism, and offers a wealth of information about how aviation terrorism was dealt with by ICAO authorities and Member States. Although ICAO normally puts all of its documentation online, no IACO *Council* Resolutions, Working Papers, or documents pertaining to specific aviation security measures are yet available to the general public. However, as discussed in chapter 4, the amount of information currently accessible (Conventions, Annexes, Protocols, ICAO *Assembly* Resolutions and Working Papers, synopses of security documents) is comprehensive enough to allow for answering the research question.

1.4.3 Time-Specific Analysis of the LRF Impact

A time-specific analysis of the impacts (if any) the LRF might have had on aviation terrorism was the last crucial part of this methodological process. This analysis was necessary to this dissertation for two main reasons. Firstly, it was the necessary quantitative step to answering the research question. Secondly, as will be discussed in more detail later, the statistics and empirical research cited in the secondary literature on civil aviation terrorism were often deeply flawed or simply inaccurate. The author was thus forced to create a more reliable source of empirical information (GACID/ATSD) in order to complete this time-specific analysis, and to do so in a way that was more accurate than would have been possible if the author had relied on the existing statistics available in the secondary literature.

This was accomplished in two steps. First, information on aviation terrorism and changes to the LRF were gathered into a simple table. Then, all the information was placed into a timeline, where the possible impact of LRF changes could be seen alongside aviation terrorism statistics. Though the list of changes to the LRF was easy to gather, aviation terrorism statistics were much harder to represent in such a timeline. Filling 80 years of aviation terrorism statistics into a

timeline was achievable, but the charts became so heavy that the analysis was almost impossible. In order to obtain a thorough picture of aviation terrorism, ATSD statistics and LRF changes were then blended into one figure— this will be discussed in chapter 5. This greatly facilitated the analysis.

1.5 *Limitations and Delimitations*

This study is limited in three ways. The first limitation lies in the incomplete open source data used in building GACID/ATSD. However, the data that was obtained and included in the databases may be judged to be largely (if not perfectly) comprehensive and reliable. The world of civil aviation is highly regulated. Member States have an obligation to report any information about the circumstances of the offence[46] (e.g., name and target of assault, date, location, duration of incident, etc.). Consequently, this regulation lessens incorrect data. Repeated crosschecking using this data confirms that the sections entitled "Categories Used to Answer Research Questions" and "Summary of Incidents" of GACID/ATSD are sound. However, information about aggressors is much more difficult to obtain. This became particularly challenging with terrorist attacks (e.g., identification of the terrorist and his/her affiliation, structure of terrorist groups, etc.). In addition, terrorist attacks are, (1) often well-structured commando operations; (2) not always claimed—and when they are, unrelated groups seeking publicity might be misleadingly making the claim; and (3) the work of very secretive organizations, which makes their identification difficult, often ascribing the blame for an attack to a splinter organization.[47]

The second shortcoming relates to access to other sources of information. Ideally, interviews with actors involved on both sides of the spectrum—including legislators, law enforcement officials and intelligence agents, as well as terrorists themselves—could shed light on additional reasons for the decline of terrorist attacks observed at particular moments in the timeline. For instance, access to ICAO decision-makers would help researchers to determine their rationale for adopting particular Conventions, Protocols, Resolutions, and Working Papers; this could also have brought a different perspective to this evaluation. Unfortunately, the author had limited or no access to such interviews and decision-makers.

Thirdly, the research was also limited in the sense that self-imposed boundaries were used to restrict the scope of the study. Hence the decision to concentrate only on international legal instruments set forth by ICAO, which could be interpreted by critical readers as limiting the acquisition of information on all

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46. The Hague Convention 1970, Art. 11; Montréal Convention 1971, Art. 13; ICAO Resolution A37-17, Appendix D, Art. 10, sec. b (8 October 2010), 35.
47. As a case in point, Palestinian groups operated under the leadership of various terrorist figureheads who quickly created splinter groups in instances of disagreement. For an illustration of this, *see* chap. 3, fig. 3.22.

possible impacts of laws and regulations on aviation terrorism. Indeed, in the last 50 years, many countries and regional organizations have made significant contributions by adopting domestic laws and implementing security measures to prevent and thwart aviation terrorism. However, the reality is that most leading national and regional legal instruments are either inspired by ICAO's work or, vice versa, that ICAO was influenced by the enhancement of aviation security at the national and regional level. Therefore, the decision to concentrate on ICAO's LRF allows the author to cover the whole spectrum of measures while avoiding redundancy.

1.6 Significance of the Study

In addition to adding value to the concept of aviation terrorism, the present study has intrinsic importance because
1. previous research has yielded incomplete and conflicting evidence concerning the specific issue of aviation terrorism;
2. through the creation of the first comprehensive database of aviation terrorism, it fills existing gaps in the literature;
3. it allows one to determine if a correlation exists between changes to the legal and regulatory framework and fluctuations observed in aviation terrorism statistics;
4. data collected in the Aviation Terrorism Sub-Database (ATSD) offers a great tool for further research on the tactic of aviation terrorism;
5. the problem of aviation terrorism affects the lives of nearly three billion travelers every year, and this number is growing annually;
6. the knowledge gathered on aviation terrorism is a useful instrument for decision-makers (governments, international civil aviation legislators, leaders in civil aviation, security practitioners, and law enforcement).

1.7 Thesis Structure

This dissertation is divided into six chapters. Chapter 1 introduces the context and the background of the study, the identified problem and the research question, the aim and significance of the study, an overview of the methodology, and limitations and delimitations of the research. The literature review in chapter 2 offers a historical perspective on the phenomena of both terrorism and aviation terrorism, selects an apposite working definition of terrorism, and identifies signature characteristics of aviation terrorism. These characteristics are central to determining whether incidents are criminal or terrorist in nature. Chapter 3 quantifies aviation terrorism in time; explains at length how ATSD was created; presents statistics to support the determination, in chapters 4 and 5, of the impact that changes to the LRF have had on aviation terrorism; identifies statistical categories, including the number of attacks, the number of deaths, and their

perpetrators; and categorizes the four main MO that aviation terrorists have used over time as ground attacks, hijackings, sabotage and suicide missions. Chapter 4 presents a short history of international civil aviation and ICAO; provides an annotated list of all LRF essentials in a chronological order; describes the main changes made to the LRF over time, including the dates at which changes were signed, ratified and entered into force; examines security standards established by ICAO; and explains that changes to the LRF are aimed at closing operational and tactical loopholes greatly exploited by terrorists. Chapter 5 gathers and analyses the main elements obtained from the two previous chapters; changes to the LRF are presented in the linear charts on aviation terrorism included in chapter 3; charts are thoroughly analyzed to gauge the impact that changes to the LRF have had on aviation terrorism through the number of attacks and deaths. Chapter 6 concludes the dissertation by analysing interesting but unexpected findings that emerged from this research.