

البحث السادس

**The Procedural aspects of the civil aviation
accidents investigation in the technological
progress context**

(Comparative study)

(بحث مكمل لرسالة الدكتوراه)

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ملخص البحث :

يعد التحقيق في حوادث الطيران المدني إجراءً بالغ الأهمية لكشف الحقيقة فيما يتعلق بهذه الحوادث. وتتمثل أهم الجوانب الإجرائية لهذا التحقيق في تحديد الدولة المنوطة بإجرائه، وإجراءات جمع الأدلة وحفظها من أجل إعداد محضر التحقيق.

ويجب أن يتم التحقيق في سياق التقدم التكنولوجي من خلال اعتماد الأدلة الإلكترونية لإثبات حقيقة الحادث، على سبيل المثال: تقرير مسجل بيانات الرحلة الذي يحتوي على كافة بيانات الرحلة، وتقرير الحمض النووي الذي يفيد في التعرف على هوية جثث ضحايا الحادث .

وبعد إعداد المحضر، إذا كان الحادث يشكل جريمة جنائية، فإنه يوضع تحت تصرف النيابة العامة لإجراء تحقيقاتها بشأنه. أما إذا كان الحادث مدنياً فقط، فيوضع المحضر تحت تصرف المتضرر للمطالبة بالتعويض. كما ينبغي وضع المحضر تحت تصرف سلطات الطيران المدني في الدولة لمعرفة أسبابه والعمل على تلافيتها تفادياً لوقوع حوادث أخرى مستقبلاً في نفس الظروف.

Abstract

The investigation of the civil aviation accidents is very crucial procedure for revealing the truth regarding these accidents. The most important procedural aspects of this investigation are represented in determining the state entrusted with conducting it, and the procedures of collecting and preserving evidence in order to prepare the investigation minute .

The investigation must be conducted in the technological progress context by adopting electronic evidence to prove the truth about the accident, for example: the flight data recorder report that contains all the data of the flight, and the DNA report, which is useful in identifying the bodies of the victims .

After preparing the minute, if the accident constituted a criminal offense, it will be placed at the disposal of the Public Prosecution to conduct its investigation regarding it. If the accident was only

civil, the minute will be placed at the disposal of the injured to claim compensation . The minute should also be placed at the disposal of the civil aviation authorities in the country in order to find out its causes and work to avoid them in order to avoid the occurrence of other accidents in the future in the same circumstances .

Introduction

1- Civil aviation accidents investigation's objectives

Civil aviation accidents Investigation is one of the most important procedural aspects which relates to the legal confrontation of these accidents, as the investigation in general is the first procedure that aims to reveal the truth and collect, process, and present information about the crime or accident to explain the circumstances of it by using questions (what, where, when, who, why and how) ⁽⁷⁸⁹⁾ .

The civil aviation accidents investigation is a systematic process that aims for the same purpose ⁽⁷⁹⁰⁾, but because of its technical nature, it also aims mainly to several purposes depending on the accident type, namely:

1- identify and describe the course of the events (what, where, when).

2- identify the direct causes and the contributing factors that led to the accident (why).

3- investigate and evaluate the basis for potential prosecution (blame).

4-evaluate and question of guilt in order to assess the liability for compensation (pay).

5-(the top important purpose) identify measures to reduce the risk to prevent future similar accidents from occurring (learning) .

This means that while the purpose of the investigation in its general form is curative, the purpose of the civil aviation accidents investigation is both curative and preventive, that if the investigation aims to determine the parties who are at fault and to

(1)Stig Andersen, Technical Report : A preliminary Process Model for Investigation, no publisher, Funded by the Norwegian Research Council and Oslo Police District, May 2019, P. 4 .

(2)ICAO, Manual of Aircraft Accident and Incident Investigation, Part III — Investigation, Work paper, Document: Doc 9756-AN/965, P. III-1-1.

then apportion blame worthiness and liability on them, the civil aviation accidents investigation takes on a completely different turns, as the purpose of it is to enhance safety by identifying the circumstances that led to the accident and make safety recommendations in order to prevent a recurrence of other similar accidents in the future ⁽⁷⁹¹⁾, as the information obtained through the investigation will lead the concerned parties to know the various causes which led to their occurrence, and thus will benefit pilots, supervisors, commanders and relevant entities in eliminating factors which may lead to occurrence other accidents, in addition to that, the investigation will reveal faults and negligence in aircraft maintenance and its equipments, in aviation security training and in piloting aircraft... which will lead to detection and addressing of these defects and avoid any other accidents expected in the future ⁽⁷⁹²⁾.

2- Internal and international legal framework

Because of the importance of the civil aviation accidents investigation, It is stipulated in article 26 of Chicago convention 1944 and its annex 13. As for article 26, it stated that " In the event of an accident to an aircraft of a contracting state occurring in the territory of another contracting state, and involving death or serious injury, or indicating a serious technical defect in the aircraft or air navigation facilities, the state in which the accident occurs will institute an inquiry into the circumstances of the accident, in accordance, so far as its laws permit, with the procedure which may be recommended by the International Civil Aviation Organization. The state in which the aircraft is registered shall be allowed to appoint observers to be present at the inquiry and the state holding the inquiry shall communicate the report and findings in the matter to that state".

(3)Sofia Michaelides - Mateou& Andreas Mateou, Flying in the face of criminalization, the safely implications of prosecuting aviation professionals for accidents, Ashgate, 2010, P. 31- 32.

(٤) اللواء دكتور/ طارق خيرت فرحات، إدارة أزمات حوادث الطيران بين السماء والأرض، دار النهضة العربية، ٢٠١٦، ص ١٦٧، ترجمة بيانات المرجع باللغة الإنجليزية :

Major General Dr. Tariq Khairat Farahat, Management of aviation accidents crises between the sky and earth, Dar Al-Nahda El-Arabiya, 2016, p. 176.

Annex 13 of Chicago Convention confirms that it is essential to know the causes of aviation accidents or incidents to prevent them from happening again. And to achieve this purpose, the best way is to conduct a methodical investigation. annex 13 brings out this point well since it specifies that the objective of the investigation is prevention ⁽⁷⁹³⁾ .

The case is concerned not only at the international level, but also at the internal level, as many local legislative and regulatory texts in many countries stipulated the civil aviation accidents investigation and adhered to what was stated in Article 26 of the Chicago Convention 1944 and its Annex No.13, for example Chapter 2 (articles from 13 to17) of Spanish Law No. 21 of 2003 on Air Safety amended by Law No.1 of 2011 on establishing the state program of operational safety for civil aviation, and Chapter 14 (Articles from 95 to 99) of the air code of Russian Federation No. 60-FZ of 1997 amended on 18 March 2023,... etc .

3- The impact of technological progress on the civil aviation accidents investigation

The main motivation for developing new accidents investigation methods is usually the occurrence of a major accident that defies existing methods, the reason why this happens is that technological systems develop continuously and rapidly and are driven by a combination of technological innovation. This progress may result in new patterns of accidents which necessitates the development of means and methods of revealing information about these accidents and assessment of their risks to adopting new safety management standards ⁽⁷⁹⁴⁾ .

The investigation procedures must also be carried out in the context of tremendous technological progress, as the causes of aviation accidents have evolved and are no longer confined to

(5)OACI, La Convention relative à l'aviation civile internationale , Annexes 1 à 18 , Annexe 13 intitulée " Enquêtes sur les accidents et incidents d'aviation ", P . 30.

(6)Erik Hollnagel, Josephine Speziali, Study on Developments in Accident Investigation Methods: A Survey of the " State-of-the-Art ", Ski, January 2008, P. 12.

natural phenomena or aircraft's manufacturing defects only, but they became due in their majority to human factors ⁽⁷⁹⁵⁾, and most of them take the form of a criminal acts, such as hijacking aircraft and terrorism acts as bombing aircraft by projectiles...etc, and no one denies the seriousness of these air terrorist acts and huge numbers of their victims ⁽⁷⁹⁶⁾ .Some perpetrators of these crimes use modern technologies to carry out them, for example what happened in April 2015, when a person named "Chris Roberts" on board a Boeing 737/80 (registered with "United Airlines" and affiliated with an American security research company) succeeded in hacking the control systems in the cockpit and controlling on the aircraft and its engines and he was even able to issue orders related to the take-off and landing of the aircraft. During the investigation with him by the US Federal Bureau of Investigation (FBI), he stated that between 2013 and 2014 he was able to access aircraft control systems when he was on board during flights for more than ten once by accessing the identifier digital (ID) of the aircraft's devices after he connected his mobile devices to the electronic box for the "In-Flight - Entertainment system" located under the passenger seats ⁽⁷⁹⁷⁾ .

Just as modern technological methods are used for committing crimes including these targeting security and safety of civil

(7)Vladimír Socha, Luboš Socha, Stanislav Szabo, Vladimir Nomic, Air accidents, their investigation and prevention, eXclusive e-JOURNAL, ISSN: 1339-4509, P. 2, Link:

<https://www.exclusivjournal.sk/files/4-2014/1-socha-socha-szabo-nemec.pdf>

(8)Rodney Wallis, Combating Air Terrorism, BRASSEY'S (US) , 1993, Foreword, P . ix.

(9)Álvaro Rocha, Hojjat Adeli, Luis Paulo Reis, Sandra Costanzo, Trends And Advances in Information Systems And Technologies, Advances In Intelligent Systems And Computing , Volume : 3, Issue : 747, Springer, 2018, P . 157. See also:

الدكتور / محمد محمد عبدالله العاصي، الحماية الجنائية لسلامة النقل الجوي، دراسة مقارنة، رسالة دكتوراة بكلية الحقوق جامعة عين شمس، ٢٠١٨، ص ١٩٣، ص ١٩٤، ترجمة المرجع إلى اللغة الإنجليزية :

Dr. Mohamed Mohamed Abd allah El-Asi, Criminal Protection for the Safety of Air Transport, comparative study, a PhD thesis in Law, Faculty of Law, Ain Shams University, Egypt, 2018, p. 193- 194.

aviation, the law must also use technological methods for revealing and confronting them ⁽⁷⁹⁸⁾ .Therefore, the civil aviation accidents investigation must be conducted in the context of technological progress by using modern techniques in collecting evidence and preserving them from damage and loss to previously mentioned desired goals of this investigation are achieved .

(10)Martin Novak, Jonathan Grier, Daniel Gonzales, New Approaches to Digital Evidence Acquisition and Analysis, p. 1. Online Link: <https://www.ojp.gov/pdffiles1/nij/250700.pdf>

Chapter 1

Entities entrusted legally with conducting the technical investigation of the civil aviation accidents

1- The country that must undertake the civil aviation accident investigation

According to Article 26 of Chicago Convention 1944, **the country in which the aviation accident occurred** is the competent country to investigate this accident, in accordance, so far as its laws permit. **However**, the same article allowed **the country of aircraft registration** to appoint observers and send them to attend the investigation in the country where the investigation is conducted and it also required this last country to communicate the reports and findings related to the investigation to the aircraft's registration country.

Article 9 of the Belgian Royal Decree, which regulates the investigations of civil aviation accidents and incidents (issued in 1998) applied the provisions of Article 26 of the Chicago Convention 1944 and added some other countries that may participate in the investigation other than aforementioned countries :

- 1- aircraft registration country .
- 2- aircraft operator country.
- 3- aircraft design country .
- 4- aircraft manufacture country .
- 5- the country, which provides information, resources or experts (at the request of the investigation unit) .

I agree with this trend, as the multiplicity of countries that will participate in conducting the investigation will allow them to achieve the interests of themselves (for example when the accident affect the safety and security of one of them) and their individuals who may be victims or responsible .

There are civil aviation legislations in some countries (especially Arab countries) that not only stipulate the multiplicity of countries that can participate in the investigation, but also stipulate some of the rights enjoyed by representatives of foreign countries that will participate in the investigation, for example, Article 104 of Egyptian Civil Aviation Law 28 of 1981 amended by Law 12 of 2018, Article 50 of UAE Federal Civil Aviation Law 20 of 1991, and Article 95 of Bahraini Civil Aviation Law 14 of 2013 amended by Law 4 of 2022. After the countries which have the right to participate in the investigation were enumerated by these Articles, the rights that the representatives of these countries must be given to them were specified . These rights in short are :

- 1- Visiting the accident scene.
- 2- Examining the aircraft wreckage.
- 3- Discussing and questioning witnesses.
- 4- View all evidence related to the accident.
- 5- Obtaining copies of all documents relevant to the accident.
- 6- Making observations on the various elements of the investigation in writing.

The aforementioned provisions relate only to the technical investigation of the accidents which involve a foreign aircraft and occur over the territory of the state conducting the investigation . On the other hand, if an accident occurred with an aircraft belonging to a country in a foreign country, the civil aviation authorities in the country to which the aircraft belongs to have the right to send representatives to the foreign country in which the accident occurred to participate in the investigation. Article 136/4 of Danish Aviation Law No. 1149 of 2017, Article 95/1 of the air code of Russian Federation No. 60-FZ of 1997 amended on 18 March 2023, and Article 106/1 of Croatian Air traffic law issued in 2014 stipulated this, with Noting that the Article106/1 of Croatian law expanded the scope of this case, so that it was not confined to the investigation of aircraft accidents that belong to the Republic of Croatia only, but rather extended it

to include the investigation of all aviation accidents in which one, some or all of the victims hold Croatian nationality, even if the accident occurred in a foreign country, even if the aircraft did not belong to the Republic of Croatia. There is no doubt that this provision confirms the protection of the Croatian authorities for their citizens wherever they are.

Regarding accidents that occur on the high seas, or in the territories that are not subject to the sovereignty of any state, the most appropriate country to investigate them is the aircraft registration country, because there is no country with specific laws that are resorted to regarding the legal regulating of the investigating accidents that occur in these cases, therefore, for solving the problem of conflict between the laws of countries related to these accidents regarding adhering to the investigation, it is more appropriate for the aircraft registration country to be granted the jurisdiction, mainly to investigate these accidents, because this country is the one where the aircraft holds its nationality, raises its flag and subjects its legal matters to its public and private legal system ⁽⁷⁹⁹⁾, therefore, it is the most appropriate country to investigate in the absence of the law of country which the accident occurred in its space. This provision is also derived from some Arab legislations, for example Article 141 of Iraqi Civil Aviation Law 148 of 1971 amended by law No 55 of 2000, and Paragraph (a) of Article 90/1 of Bahraini Civil Aviation Law 14 of 2013 amended by law 4 of 2022.

2- The Formation of the civil aviation accidents investigation committee

The legislator stipulated in some countries that the investigation must be carried out by an employee or officer, for example Paragraph 1 of Article 32AA of Part (IIIA) of Australian Civil Aviation Act 63 of 1988 amended by Act 143 of 2020, and Article 79 of Lebanese Civil Aviation Law 1949. But in majority countries, it is stipulated that a specific committee conduct the

(11)Air Law, International Air law, UK air law, Operational procedures, Oxford Avion Training , P 61 .

technical investigation of civil aviation accidents, for example Article 13/1 of Spanish Law No. 21 of 2003 on Air Safety amended by Law No.1 of 2011, and Article 134 of Danish Aviation Law No. 1149 of 2017.

In United States of America, civil aviation accidents are investigated by an independent Federal agency called: National Transportation Safety Board "NTSB", charged by Congress with investigating every civil aviation accident in the US and significant accidents in other modes of transportation—railroad, highway, marine and pipeline ⁽⁸⁰⁰⁾ .

In United Kingdom, the entity which is entrusted legally with the investigation of civil aviation accidents and incidents is the Air Accident Investigation Branch (AAIB) . It is an independent organization embedded within the Department for transport and it is completely separate from the civil aviation authority ⁽⁸⁰¹⁾ .

According to what is being done in many countries, the legislators or the civil aviation authorities determine the investigation bodies at a set of levels, according to the nature and gravity of each accident and its results, that the legislator or representative of the air safety department may assign a single officer for the investigation if the circumstances of accident are simple and its damages are limited . This is derived from Article 54/4 of Civil Aviation Code of the Republic of Armenia No. ՀՕ-81-Ն of 2007 amended by Law No. HO-294-N of 2018 .

But if the circumstances of accident were serious, such as cases of technical malfunction in aircraft operation, air collision, illegal seizure of aircraft, bombing them with projectiles, or if there were indications of negligence or failure to perform the duties imposed, or if the consequences of the accident were serious, such as deaths

(12)The official page of the National Transportation Safety Board "NTSB" at the link:

<https://www.nts.gov/about/Pages/default.aspx>

(13)AAIB, Aircraft Accidents -Guidance for the police, Emergency Services and Airfield Operators, P. 3. Link:

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/919973/Guidance_Pub_version_High_amend.pdf

or severe injuries, or that one of victims is an important person ... etc, an investigation committee must be formed. **this committee usually consists of** :

2-1 The Committee Chairman

He is the one who calls the committee to convene, supervises the organizational work of the investigation, directs its course, and undertakes all matters related to the management of the committee members.

2-2 Officers for legal investigation

They are policemen and work under the supervision of the Public Prosecution, and their role is to use modern methodological methods in the investigation, documenting evidence, and preparing reports.

2-3 Pilot Officer

He holds a license that qualifies him to identify the model of the stricken aircraft.

2-4 Maintenance Engineer

He determines the condition of the aircraft before the accident and supervises the inspection of all parts of the aircraft to search for faults that may have contributed to or caused the accident.

2-5 An intelligence officer

He investigates aspects related to air sabotage and destruction and searches for evidence thereof, especially in incidents of bombing aircraft with projectiles, or illegal seizure of them, as well as taking the necessary security measures.

2-6 A delegate from the Technical Inspection Department

He assists in the collection and recording of evidence and provides the required assistance. He also continuously follows up on the causes of known previous accidents to be able to compare the accident in which the investigation is being conducted with a similar previous accident.

2-7 Doctor

To identify the cases of death or injury and to cover the health aspects which are necessary for treating the injured.

2-8 Expert Observer Member

This is when experts are needed in specific disciplines and fields. Their reports may be useful in revealing defects that led to the accident ⁽⁸⁰²⁾.

There are some countries whose regulations **stipulated the formation of an investigation committee for the civil aviation accident**, for example in Russia, that article 2.1.3 of the rules of investigation of civil aircraft accidents and incidents in the Russian Federation No. 609 of 1998 stipulated that the commission consists of the chairman, vice-chairmen and members of the commission. Specialists involved in the work of the commission may be members of its working bodies (subcommittees and working groups) or be resorted as experts.

In the event of an accident occurring over the territory of the state, **and this accident is related to a military and a civilian aircraft**, such as the collision of the two aforementioned aircraft, a joint investigation committee must be formed. This committee includes an equal number of representatives of the civil aviation authorities and representatives of the military air forces of the country in which the accident occurred . The committee shall report its report to the competent civil aviation authorities to take the necessary measures under international rules and regulations. This is derived from Article 13/4 of Spanish Law No. 21 of 2003 on Air Safety amended by Law No.1 of 2011 .

It is worth noting that the financing of investigation committee members is from the state treasury ⁽⁸⁰³⁾, and their dismissal shall be by a decision of the competent minister ⁽⁸⁰⁴⁾.

(١٤) اللواء دكتور/ طارق خيرت فرحات، إدارة أزمات حوادث الطيران بين السماء والأرض، مرجع سابق، ص ١٨١ ، ترجمة المرجع باللغة الإنجليزية :

Major General Dr. Tariq Khairat Farahat, Management of aviation accidents crises between the sky and earth, Op. Cit. P. 181.

3 Characteristics and traits that the investigator should possess

For achievement of purposes of investigation according to Chicago Convention 1944 and its Annex 13 and relevant legislations and regulations, any one competent legally to the investigation **must meet several characteristics**, which are impartiality and integrity and they must be above the level of suspicion and not be subject to any influences ⁽⁸⁰⁵⁾. These characteristics were stated also in ICAO in Part II of its Manual of Accident Investigation (Doc 6920, 1970), "Technical skill, perseverance, and logic are the tools of [an investigator's] profession humility, integrity and respect for human dignity, his guiding rules " ⁽⁸⁰⁶⁾.

Furthermore, teamwork must be prevailed among the investigation committee members, that each member can cooperate with other members in completing this investigation. They must also work to link each error to a cause, so that the factors causing all errors leading to the accident are correctly formulated to avoid them on future flights ⁽⁸⁰⁷⁾.

They must also have an experience and technical knowledge in their fields. This is derived from Paragraph 2 of Article 32AA of

(15) Article 99/1 of air code of the Russian Federation No. 60-FZ of 1997 amended on 18 March 2023 stipulated that the expenses of ensuring the work of the committee of the civil aviation accident investigation are financed from the federal budget.

(16) Article 14/4 of Spanish Law No. 21 of 2003 on Air Safety amended by Law No.1 of 2011 stated that the members of the commission will leave their position due to resignation accepted by the Minister of Public Works, expiration of the term of their mandate or by dismissal agreed by the Minister of Public Works .

(17)Rory J. McMahon, CLI, CFE, Practical Handbook for Professional Investigators, Third Edition, CRC Press, 2013. P. 213.

(18)John Owens, the traits of a good investigator, Article published in: ACCIDENT INVESTIGATIONS: Safety Through Understanding, European Civil Aviation Conference Magazine, SPRING 2017, P. 5.

(١٩) اللواء دكتور/ طارق خيرت فرحات، إدارة أزمات حوادث الطيران بين السماء والأرض، مرجع سابق، ص ١٧٨، ترجمة المرجع باللغة الإنجليزية :

Major General Dr. Tariq Khairat Farahat, Management of aviation accidents crises between the sky and earth, Op. Cit. P. 178.

Part IIIA of Australian Civil Aviation Act 63 of 1988 amended by Act 143 of 2020, which stated that " ... CASA must not appoint an officer as an investigator unless CASA is satisfied that the officer has suitable qualifications and experience to properly exercise the powers of an investigator...".

According to what is being done in some countries, It is required for anyone who applies to be appointed for a position in a civil aviation accident investigation authority to spend several years working in the aviation industry, either as a pilot or an engineer,...depending on the position being applied for. However, it is also recognized that some larger investigation authorities may employ graduates or less experienced personnel and allow them to gain experience within their work in their organization ⁽⁸⁰⁸⁾ .

In all cases, according to the general rules in the conditions that must be met in any investigator in general, each member assigned to the investigation must adhere to the principle of legality, so that every investigation procedure is taken under the guarantees guaranteed by the relevant legal texts without deviating from them ⁽⁸⁰⁹⁾ .

(20)John Owens, the traits of a good investigator, Article published in: ACCIDENT INVESTIGATIONS: Safety Through Understanding, European Civil Aviation Conference Magazine, Op. Cit. P. 5.

(21)Rory J. McMahon, CLI, CFE, Practical Handbook for Professional Investigators, OP. Cit . P. 472. see too: United Nations Juridical Yearbook, issued 43-44, UN, 2005, P. 63.

Chapter 2

Preparing technical investigation minute

Before conducting the investigation, **the accident must be reported firstly to the competent authorities**. According to what is worked in most countries, for example United Kingdom, when an aviation accident occurs, the pilot is the first one responsible legally for notification of it to the Air Accident Investigation Branch (AAIB), if he/she is killed or incapacitated, then the operator. And if the accident occurs on or adjacent to an aerodrome, then the aerodrome authority is also required to notify the accident.

In practice, initial information regarding an accident usually reaches the (AAIB) from the police dealing with the accident but the reports may come also from Air Traffic Control (ATC), an airport authority, the pilot, or any one of the public. Any one learning of an aviation accident or incident should, in addition to alerting the Police and the Emergency Service, report the accident to the (AAIB) as soon as possible.

The person who reports an accident directly to the (AAIB) is also required to report the local police about this accident and its place. This may be the first information received by the police, although it is more likely that additional information will have already come to them through emergency calls. The police should immediately telephone the (AAIB) and pass on as much additional information as is available ⁽⁸¹⁰⁾.

The majority of comparative civil aviation legislations and regulations also stipulate that it is necessary to report aircraft accidents and incidents immediately upon their occurrence for the legal measures to be taken regarding it, for example Paragraph 1 of Article 105.B of Croatian Air Traffic Code issued in 2014, Article 93/1 of the Air Code of Russian Federation No. 60-FZ of 1997 amended on 18 March 2023, Article 137 of Danish Aviation Law

(22)AAIB, Aircraft Accidents -Guidance for the police, Emergency Services and Airfield Operators, Op. Cit. P. 6.

No. 1149 of 2017, and Article 10 of Turkish Civil aviation law issued in 1983. These and other legislations implemented what was stipulated in Annex 13 of Chicago Convention 1944, as it stipulated obligating ICAO member states to set rules that regulate the reporting of aviation accidents ⁽⁸¹¹⁾ .

After the accident is reported to the competent authorities, the investigation committee begins to undertake the investigation procedures to prepare the investigation minute. The relevant legislations and regulations give the investigation committee the right to carry out a set of procedures for conducting the investigation. **These procedures are:**

1- Entering and inspecting the accident scene and surrounding areas

Most of comparative civil aviation legislations and regulations allowed the investigation committee members to enter the accident scene and its surroundings to inspect it and its buildings and facilities, as well as to inspect any evidence related to the accident in it to prove it in the investigation minute, for example Paragraphs (A,B) of Article 32AC/1 of Australian Civil Aviation Act 63 of 1988 amended by Act 143 of 2020, and paragraph (a) of Article 8/2 of The Royal Belgian Decree which regulates the investigation of civil aviation accidents and incidents (issued in 1998 amended in 2007) .

2- Requesting the assistance of experts and specialists

According to Article 134/3 of Danish Aviation Law No. 1149 of 2017, and Article 4/1 of Royal Belgian Decree which regulates the investigation of civil aviation accidents and incidents (issued in 1998 amended in 2007),... and others, the investigation committee

(23)Parlement Européen, Direction Generale Des Politiques Internes De l'union, département thématique politiques structurelles et de cohésion, transport et tourism, comptes rendusd'événements et enquêtes sur les accidents ou incidents dans l'aviation civile européenne, étude, 2010, P. 27. Look also at:

OACI, La Convention relative à l'aviation civile internationale, Annexes: 1 à 18, Op. Cit. P. 30.

have the right to request the specialists and experts in various fields to assist it in the investigation by giving their opinion about any matter relates to the accident according to their knowledge of their specialties. Despite the importance of that, **the report including their opinions or theories is advisory** and non-binding to the committee. This is derived from Article 99 bis of Egyptian Civil Aviation Law No. 28 of 1981 amended by Law No. 12 of 2018, and Article 142 of its Iraqi counterpart No.148 of 1974 amended by law 55 of 2000. It is consistent with the general rules regarding the seeking of assistance of experts, that the judge has discretion in following the expert's opinion or not (⁸¹²).

Despite that, the committees adopt the reports of experts in many cases and rely on them in the investigation. For example in USA, the NTSB has the right to request the assistance of industry experts to provide technical expertise by designating organizations or corporations as parties to the investigation. only those that can provide the necessary technical expertise to the investigation are granted party status and are permitted to serve on the investigation. All party members work with and report to the NTSB. The NTSB has complete discretion over which organizations it designates as parties to the investigation (as experts), other than the FAA, which by law is automatically designated as a party (⁸¹³).

Also in 1961 in Britain, a Ministry of Aviation Committee report dealing with civil aviation accident investigation acknowledged the potential value of "aero-medical specialists" attending the scene of a major accident, for both their help in the assessment of safety factors and their contribution to the determination of accident cause or the elimination of possible causes. the report

(24)Santo Davide Ferrara, Personal Injury and Damage Ascertainment Under Civil Law, State-of-the-Art International Guidelines, Springer International Publishing, 2016, P. 142 .

(25)Daniel S. Riley, Michael W. Pearson, Foundations of Aviation Law, Taylor & Francis, 2016, P. 183.

recommended that "aero-medical specialists" participate in accident investigations whenever possible ⁽⁸¹⁴⁾ .

3- Collecting and preserving evidence

The investigation committee must take all necessary measures and precautions to preserve and confiscate evidence and prevent unauthorized interference to avoid tampering with it, which leads to obscuring or distorting it in a way that negatively affects its value in revealing the truth. This is derived from Article 65/3 of Lebanese Civil Aviation Safety Law 2005 and Paragraph 2 of Article 32AH of Australian Civil Aviation Act 63 of 1988 amended by Law 143 of 2020 .

Similar to the system of free evidence according to general rules of criminal procedures followed in connection with any crime or accident, the investigator of civil aviation accident must be free to resort to any evidence related to the accident without obligating him to a certain number of them exclusively **provided that he adheres to the principle of legality** ⁽⁸¹⁵⁾. If that is the case, it is appropriate to resort to technical evidence in proving the truth about the accident under investigation, for example:

3-1 Flight data recorder (FDR)

flight data recorder (FDR) or as its common name " The Black Box" ⁽⁸¹⁶⁾ is one of the most important devices in the aircraft. it is very important to receive information about the accident, as it records all information related to the flight, that the obvious benefit of it is the ability to use recorded information to compare an aircraft's theoretical performance with data that describes the aircraft's flight profile to discover the possible effect of external

(26)Peter J. Stevens, Fatal Civil Aircraft Accidents, Their Medical and Pathological Investigation, Elsevier Science, 2014, P. 6.

(27)Géraldine Vial, Olivier Leclerc, Etienne Vergès, Preuves scientifiques et technologiques, HAL, 7 Nov 2020, P. 1.

(28)AAIB, Aircraft Accidents -Guidance for the police, Emergency Services and Airfield Operators, Op. Cit. P. 22.

forces and aid determination of a probable cause for the accident⁽⁸¹⁷⁾ .

3-2 Report on the DNA analysis results

Report of the deoxyribonucleic acid (DNA) is other evidence that the investigators can resort to for identifying the bodies of the accident victims. It is a nucleic acid, which is a chemical substance that controls the development of the shape of cells and tissues in the human body⁽⁸¹⁸⁾ . By finding human bones, traces of blood, or the remains of body parts, it is possible to identify the personality of its owner by comparing the DNA sample taken from him and the DNA sample taken from his parents, children, or any of his relatives.

DNA analysis technology has already been used in the field of identifying unidentified corpses, especially in cases of mass disasters and land, maritime, and air transport accidents. It was used to take blood samples from relatives of the victims of the Egyptian aircraft that crashed near the shores of the USA in 1999 to identify the remains of victim's bodies by matching the genetic characteristics of blood, teeth, and head hair⁽⁸¹⁹⁾ .

The French authorities also conducted genetic tests by using DNA technology to identify the personality of 320 passengers on the Airbus aircraft, which crashed near Strasbourg on 20 January 1992⁽⁸²⁰⁾ .

(29)ROBERT T. FRANCIS II, an essay entitled:" Aviation accident investigation methods and boundaries of safety system", Published in: Hans M. Soekkha, Aviation safety VSP,1997, P.15.

(30) الدكتور/ جميل عبد الباقي الصغير، أدلة الإثبات الجنائي والتكنولوجيا الحديثة (أجهزة الرادار- الحاسبات الآلية- البصمة الوراثية)، دراسة مقارنة، العدد الثالث، دار النهضة العربية، ٢٠١٧، ص ٦٣، ترجمة المرجع باللغة الإنجليزية :

Dr. Jamil Abdel-Baqi Al-Saghir, Criminal Evidence and Modern Technology (Radar Devices - Computers - Genetic Fingerprint), Comparative Study, Third Edition, Dar Al-Nahda Al-Arabiya, 2017, P. 63.

(31) Ipid, P. 73.

(32) Ipid, P. 73 &look also at:

Université du Michigan, Universalia : les événements, les hommes, les problèmes, Encyclopaedia Universalis, France, 1993, P. 312.

3-3 Collecting and preserving the aircraft wreckage

The most important thing that must be preserved is the aircraft wreckage. Article 101 of Egyptian Civil Aviation Law No. 28 of 1981 amended by Law No. 12 of 2018, and Article 93 of Bahraini Civil Aviation Law No. 14 of 2013 amended by law No.4 of 2022... stipulated that when an aircraft accident occurs, the competent authorities must collect and preserve its parts and wreckage and not move it from its position **except for necessity** ⁽⁸²¹⁾ until the arrival of the investigation committee and the issuance of its orders and instructions in this regard, **that the investigation committee alone has the competence to give the order to movement of wreckage if that is necessary.**

The wreckage that has been transported from the accident site must be placed in a safe place preferably near the accident site, or at the nearest airport to this site and it must be placed in a special place away from the places where people are inside, such as waiting for places, or departure and arrival halls ..., and the airport administration must supervise its maintenance, as the care in transporting and preserving the wreckage will help the investigation committee to subject it to detailed analyzes and to verify the suspected factors that may have caused the accident.

It is worth noting that the following authorities - in order - are responsible for protecting the aircraft wreckage in the event of its crash as a result of an emergency landing at a location far from the nearest airport to the place of investigation:

- 1- pilot (if his condition permits).
- 2- local police.
- 3- The director of the nearest airport to the accident site ⁽⁸²²⁾ .

(33)Article 16 of the Turkish Civil Aviation Law gave this right to aircraft owner, but if he uses this right, he must collect the wreckage within 90 days and paying preservation costs.

(٣٤) اللواء دكتور/ طارق خيرت فرحات، إدارة أزمات حوادث الطيران بين السماء والأرض، مرجع سابق، ص ١٨٦، ص ١٨٧، وأنظر أيضاً : الدكتور/ طارق الجمال، الإستراتيجية العامة لمواجهة

4- Preparing initial reports

Civil aviation legislation in some countries, for example Article 108 of Egyptian Civil Aviation Law No. 28 of 1981 amended by Law No. 12 of 2018, and Article 98 of Bahraini Civil Aviation Law No. 14 of 2013 amended by Law No. 4 of 2022... stipulated that the investigation committee shall submit an initial report on the accident or incident and the causes and circumstances surrounding it to the head of accident department. Then the investigation minute is submitted to him to be presented to the competent minister for approval and sending it to the competent authorities. He shall also present the aforementioned reports to the states and authorities related to the accident .

5- Preparing the investigation minute

After the investigation committee has done all of the above, it prepares the investigation minute, then it summons the accused, the surviving victims, and the witnesses to question and interrogate them and record their statements in the minute and assign them to provide any information, papers or things that it deems necessary to reveal the truth. This is derived from Article 99 bis of Egyptian Civil Aviation Law No. 28 of 1981 amended by Law No. 12 of 2018, and paragraph 1 of Section 32AJ of Australian Civil Aviation Act 63 of 1988 as amended by Act 143 of 2020 .

The general rules recognized in criminal procedure laws and relevant regulations regarding interrogation must be observed when doing so, that the interrogation must take place until it is convinced that it is not possible to obtain additional information, and the committee has the right to ask any question it deems necessary to reveal the truth about the accident, however, neither a witness nor the accused or any person being interrogated may be

حوادث الطيران، عمليات الإنقاذ ومكافحة الحرائق، مكتبة الكتب العربية، العدد الأول، ٢٠٠٦، ص ٢٨٦، ترجمة المرجعين باللغة الإنجليزية :

Major General Dr. Tariq Khairat Farahat, Management of aviation accidents crises between the sky and earth, Op. Cit. P. 186-187 & see also Dr. Tariq El-Jamal, The General Strategy for Aircraft Accidents, Rescue Operations and Fire Fighting, Arab Books Library, first edition, 2006,(Arabic literature translated into English by me),P. 286.

compelled to respond to testify or answer questions, **that the right to silence is guaranteed to those who are being interrogated.** It is also not permissible to influence the person who is being interrogated by word or deed to force him to answer, confess or give a specific testimony.

The investigation committee must recite the statements of each person interrogated in his presence and with an audible voice and he may express any amendment to his statements and then sign his statements on each page of the minute and the committee may re-summon the person interrogated to take his statements again or to record additional notes if it is necessary.

The investigation committee shall enclose any documents, papers, or materials submitted by the experts, witnesses, or any person who was interrogated while giving their statements in the minute .

It is worth noting that some European legislation, for example Article 106/3 of Croatian Air Traffic Code issued in 2014, and Article 18 of Spanish Law No. 21 of 2003 on Air Safety amended by Law No.1 of 2011... stipulated that **the investigation minute must be secret and not to be available for purposes other than the investigation** unless the permission of the competent court (in Croatian law), or the competent authority in the state security department (in Spanish law) .

As for the investigation minute's content, it must include all the required information about the accident. This information must be arranged in subject headings as follows:

5-1 Description of the events

A detailed and clear account of the events leading up to the accident must be included under this heading by displaying all the information about the stages that the flight during which the accident occurred went through from its inception until the accident occurrence taking into account the chronological sequence of events. The aforementioned events must include

specifying the circumstances and facts of the accident including its time and place and arranging them in chronological order.

If the causes of the accident are known, they must be mentioned, and whether or not there was a violation of the relevant legal texts. In the event of a violation, it must be mentioned whether it was intentional or negligent.

The extent of the damage to the aircraft and properties on board or the ground as a result of the accident must also be determined and the percentage of deaths and injuries must be determined too. If the accident is related to military personnel, it must be determined whether or not they are still on military service, because if they are so, the military law will be applicable law.

Any other information was other than the foregoing that is relevant to the accident must be mentioned in the minute.

5-2 Analysis of the events and their causes

This heading should include the logical conclusions of the investigation committee members regarding the causes of the accident. These conclusions must not be based on the investigator's personal opinion, but rather they must be based on what was found in evidence and what was proven in the minute of the statements of the accused or the victims (in case they survived), the testimony of witnesses and other audio, visual, recorded and written evidence.

5-3 Results of the investigation

When the committee chairman makes sure that all the information mentioned in the minute is true and supported by evidence of all kinds as stated above, he must prepare the results of the investigation and record them in the minute under the heading "Results of the Investigation". He must also note under the same heading whether there are points that the committee was unable to extract during the investigation. He should also record the committee's observations about whether there were violations of the applicable legal instructions and texts, whether intentionally or negligently, even if these texts were not related to the field of

aviation as long as they were useful in revealing the truth regarding the accident ⁽⁸²³⁾.

After the investigation minute is written, the committee shall refer it to the competent civil aviation authorities or the competent minister to approve it and then send it to the competent authorities to complete the legal procedures regarding it, or to place it in the hands of those who have a concern in obtaining it ⁽⁸²⁴⁾.

If it is derived from the investigation minute that the accident is civilian, then these authorities must place the minute under the hand of those affected by the accident to know its causes and then claim civil compensation suit against the person responsible or affiliated with him/her before the competent court ⁽⁸²⁵⁾.

On the other hand, **if the accident constitutes a criminal offense**, the minute is referred to the Public Prosecution Office⁽⁸²⁶⁾ to conduct a criminal investigation of the accident under the general rules of the Criminal Procedure Code.

If the accident is in civilian and criminal nature at the same time, the injured party may file a civil lawsuit in parallel with the criminal case before the criminal court if the necessary conditions for that are met. This is stipulated in the criminal procedure codes of countries that allow the system of filing civil lawsuits in parallel with a criminal lawsuit, for example Article 85 of the French Code of Criminal Procedure and Article 251 of the Egyptian Code of Criminal Procedure.

6 Re-convene the investigation committee if necessary

(٣٥) اللواء دكتور/ طارق خيرت فرحات، إدارة أزمات حوادث الطيران بين السماء والأرض، المرجع السابق، من ص ١٨٩ إلى ص ١٩٢، ترجمة المرجع باللغة الإنجليزية :

Major General Dr. Tariq Khairat Farahat, Management of aviation accidents crises between the sky and earth, Ipid, P. 189-192.

(36)Article 55/2 of the Civil Aviation Code of the Republic of Armenia No. ՀՕ-81-Ն of 2007 amended by law No. HO-294-N of 2018.

(37)Article 143 of Executive Regulations of the Egyptian Civil Aviation Law issued by Resolution No. 1/I of 1989.

(38) Article 108 of the Egyptian Civil Aviation Law No. 28 of 1981 amended by Law No. 12 of 2018.

Much of civil aviation legislations, such as Article 101 of Bahraini Civil Aviation Law No. 14 of 2013 amended by Law No. 4 of 2022, Article 111 of Egyptian Civil Aviation Law No. 28 of 1981 amended by Law No. 12 of 2018, and Article 106/4 of Croatian Air traffic law issued in 2014... stipulated that If it appears to the civil aviation authorities that there are some evidences were omitted to be mentioned in the investigation and were useful in revealing the truth, or that some aspects were not covered in the investigation minute as required, or that new evidence has appeared that will change the results that were mentioned in the minute,... it is permissible for the civil aviation authorities to invite the investigation committee to convene again to prove that in the minute, or to write additional minute for it, or to re-write the minute altogether including the new information and results with an explanation of the reasons for adding them and the new evidence on which it was based and the same procedures and guarantees that were previously stated regarding preparing of the basic investigation minute must be followed regarding these additions ⁽⁸²⁷⁾ .

(٣٩) اللواء دكتور/ طارق خيرت فرحات، إدارة أزمات حوادث الطيران بين السماء والأرض، مرجع سابق، ص ١٨٢، ترجمة المرجع باللغة الإنجليزية :

Major General Dr. Tariq Khairat Farahat, Management of aviation accidents crises between the sky and earth, Op. Cit. P. 182.

Conclusion

Results :

At the end of this research, it was concluded that the main purpose of the investigation of the civil aviation accidents is not only imposing legal responsibility on those who caused these accidents, but rather aims to know the defects and reasons that led to occurrence of them and work to fix or remove them to avoid any other accidents in the future in the same circumstances . To find out the reasons of accident, the investigation minute must be prepared including them and all the circumstances in which the accident occurred should be established in it.

The investigation minute must also include a mention of all evidence that is useful in revealing the truth about the accident (especially the technical and technological evidence, such as the report of the results of the DNA and the flight data recorder FDR).

And because the reasons of civil aviation accidents have evolved since the dawn of aviation until now, the procedures of the technical investigation of these accidents should be conducted in the context of technological progress by using modern technological and technical means in collecting and preserving evidence to prove it in the investigation minute.

Recommendations :

1- Hope in the event of an accident involving an aircraft belonging to particular country in a foreign country that the civil aviation laws in various countries follow the example of Article 106/1 of Croatian Air Traffic Law in expanding the scope of the right of the civil aviation authorities in the country to send representatives to the foreign country in which the accident occurred to participate in the investigation of the accident, so that this right is not limited to the investigation of accidents of aircraft belonging to the state only, but must also include the investigation of all accidents in which one or some or all of its victims hold the nationality of the state, even if the aircraft was foreign and the accident occurred in a foreign country. There is no doubt that this

provision confirms the protection of the authorities of the state for their citizens wherever they are.

2- Hope the legislators in various countries will follow the example of Article 106/3 of Croatian Air Traffic Code issued in 2014, and Article 18 of Spanish Law No. 21 of 2003 on Air Safety amended by Law No.1 of 2011, and Article 102 of Bahraini Civil Aviation Law No. 14 of 2013 amended by Law No. 4 of 2022 and amend civil aviation laws by adding articles that prohibit the circulation of investigation minute into civil aviation accidents and evidence related to them.

3- Hope to apply the principle of "freedom of proof" for proving the occurrence of civil aviation accidents by allowing the adoption of any evidence useful in revealing the truth about these accidents, especially if they are technical or technological evidence.

4- Although expert reports are not binding on the investigator or the judge, i hope that they will be adopted and taken into account in the investigation, provided that they are prepared without transgression, errors, or violation of the principle of legality.

5- Persons of integrity, experience, and necessary qualification (each according to his field of specialization) must be entrusted with investigating civil aviation accidents .

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