

Comparative Study of Dangerous Goods Handling in Airlines Operating at Soekarno-Hatta International Airport

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Abstract

This paper investigates the handling of dangerous goods on flights that often occur. Security problems at the airport can be seen from the many incidents that disrupt flight activities to and from the airport. Each airline has its own standard operating procedure (SOP). In this study, the differences in SOPs between two airlines - namely Citilink Indonesia and Lion Air - at Soekarno-Hatta International Airport will be studied, especially in terms of handling dangerous goods. The type of research used is descriptive qualitative, because the description of the data is expressed in the form of words. The data collected will be reduced and presented, then conclusions will be drawn from the presentation of the data. The results show that handling dangerous goods certainly has a very high risk, therefore airport officers need to carry out their duties according to SOP. Each officer must be supervised in working, where training in the involvement of handling dangerous goods on aircraft is the main requirement beforehand.

Keywords: airlines, SOP, dangerous goods handling, Citilink, Lion Air.

Introduction

In Law Number 1 of 2009 (*Undang-Undang Nomor 1 Tahun 2009*) concerning aviation, it is explained that an airport is an area on land and/or waters with certain boundaries that is used as a place for aircraft to land and take off, pick up passengers, pick up and drop off goods, and a place for intratransportation transfers, which is equipped with flight safety and security facilities, as well as basic facilities and other supporting facilities. With a very large airspace, Indonesia is one of the countries that cares about and continues to maintain flight safety and security. Airport security is mostly carried out to stop hijacking, drug smuggling, and reduce small things so that they do not cause many incidents. Security problems at airports can be seen from the many incidents that disrupt airport activities, including cases found at the departure and arrival terminals, such as the incident of passenger cabin baggage catching fire during the boarding process on Batik Air flight ID 6272 on the CGK-MDC route on July 28, 2023. Then another problem based on the researcher's observations when traveling using air transportation or aircraft services is that at the airport there are still many incidents that disrupt flight safety and security.

The airport authority office plays a full role in implementing the regulation, control, and supervision of the implementation of operational performance standards for airport services, air transportation, aviation security, aircraft, and flight navigation. In carrying out security and air transportation duties, the airport authority office has the task of preparing regulatory materials. Control and supervision of aviation security facilities and equipment and emergency services, in accordance with standard operating procedures (SOP). In handling dangerous goods on flights, problems often occur.

In this study, the method of handling dangerous goods on flights will be examined. The objects of research chosen are the SOPs of two airlines, namely Citilink Indonesia Airlines and Lion Air Airlines. The SOPs of the two airlines are compared to identify differences and similarities, and to find patterns or relationships between the variables studied. The results of primary and secondary data, as well as supporting literature will be analyzed and discussed. Finally, conclusions will be drawn regarding the similarities and differences in handling dangerous goods on the two airlines

operating at Soekarno-Hatta International Airport.

Literature Review

Airport authority office. The airport authority office is leaded by a head. The airport authority office carries out the following functions:

- a. Implementation of regulation, control, and supervision in the field of flight safety, security, smoothness, and comfort at the airport;
- b. Implementation of coordination of government activities at the airport;
- c. Implementation of regulation, control, and supervision in the field of airport facilities, services, and operations;
- d. Implementation of regulation, control, and supervision of the utilization of airport land and/or water areas in accordance with the airport master plan in accordance with the airport master plan;
- e. Implementation of regulation, control, and supervision of the utilization of flight operation safety areas (kawasan keselamatan operasi penerbangan, or KKOP) and work environment areas (daerah lingkungan kerja, or DLKr) and airport interest environment areas (daerah lingkungan kepentingan bandar udara, or DLKP);
- f. Implementation of regulation, control, and supervision of the implementation of operational performance standards for airport services, air transportation, aircraft flight security, and flight navigation;
- g. Implementation of regulation, control, and supervision of the implementation of airport environmental preservation;
- h. Implementation of regulation, control, and supervision in the field of air transportation, airworthiness, and aircraft operation at the airport, implementation of provisions regarding aircraft maintenance organizations, as well as competency certificates and licenses for aircraft operating personnel;
- i. Issuance of certificates of continuous airworthiness for aircraft that are not in the transportation or commercial category;
- j. Implementation of regulation, control, and supervision in the field of aviation security and emergency services at the airport; and Implementation of administrative and household affairs of the airport authority office.

Soekarno-Hatta International Airport. Soekarno Hatta International Airport (IATA: CGK, ICAO: WIII) is the main airport serving flights to Jakarta, Indonesia. This airport is named after the names of the proclaimers of Indonesian independence, Soekarno and Mohammad Hatta, who were also the first president and vice president of Indonesia. This airport began operating in 1985, replacing Kemayoran Airport (domestic flights) in Central Jakarta, and Halim Perdanakusuma in East Jakarta. Soekarno-Hatta Airport has an area of 18 km², has two parallel runways separated by two taxiways with a length of 2.4 km. There are two main terminal buildings, namely Terminal 1 for all domestic flights except flights operated by Garuda Indonesia and Terminal 2 serves all international flights except Garuda Indonesia flights.

Definition of airline. An airline is a private or government-owned business entity that specifically provides air transportation services for public passengers, both scheduled (schedule service/regular service) and unscheduled (non-schedule service). An airline is an airline company that issues flight documents to transport passengers and their luggage, cargo, and postal goods (letters) using aircraft.

PT. Citilink Indonesia. Since 2001, Citilink Indonesia has operated as a low-cost airline in the form

of a Garuda Indonesia business division using only a few aircraft, limited bandwidth management, and several routes with a focus on developing the Garuda Indonesia brand as a premium airline. After Garuda's significant business changes in 2011, the development and expansion of Citilink also became the main focus of the Garuda Group. Citilink has a vision to become a leading low-cost airline in the regional area by providing scheduled and low-cost commercial air transportation services and prioritizing safety.

PT. Lion Air. PT Lion Air Group was founded by Rusdi Kirana and his brother, Kusnan Kirana on November 15, 1999, which was originally named PT Lion Mentari Airlines. Lion Air carries a vision for the aviation industry to provide the widest possible access to consumers from various social backgrounds, this then made Lion Air's motto "We Make People Fly" with the Vision "to become a national private airline that serves domestic and international flights by adhering to the principles of flight safety and security that have been established". The mission is "to become an innovative, efficient and professional national airline in reaching several cities in Indonesia so that more service users can fly with Lion Air".

Dangerous goods. Dangerous goods are divided into 9 (nine) classifications, namely:

- a. *Class 1 (explosives and shock-sensitive materials)* – This class has six divisions: (1) substances and goods that have a mass explosion hazard, (2) substances and goods that have a projection hazard but are not mass explosion materials, (3) substances and goods that have a fire hazard and a light explosion hazard or a minor projection hazard or both, (4) substances and goods that do not pose a significant hazard only a small hazard if there is contact or initiation during transport with any effects that are mostly limited to the packaging, (5) very insensitive substances that have a mass explosion hazard, and (6) very insensitive goods that do not have a mass explosion hazard. Labels of class 1 dangerous items are shown in Figure 1.

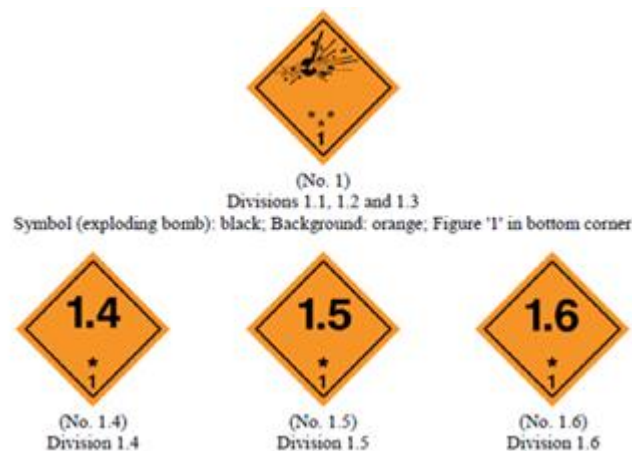


Figure 1. Class 1 dangerous items labels.

- b. *Class 2 (gas)* – What are included in dangerous goods in this class are: (1) flammable gas RFG: Butane Gas, Hydrogen Gas, Propane Gas, Acetylene Gas (Butane, Hydrogen, Propane, Acetylene, Matches); (2) non-flammable gas RNG: Carbon Dioxide Gas, neon gas, gas from fire extinguishers, liquefied gas and helium gas (carbon dioxide, neon, fire extinguishers, liquid nitrogen/helium); and (3) toxic gas RPG: Aerosol gas, tear gas (aerosol, tear gas). Figure 2 shows the labels for goods that fall into the dangerous goods class 2 category.

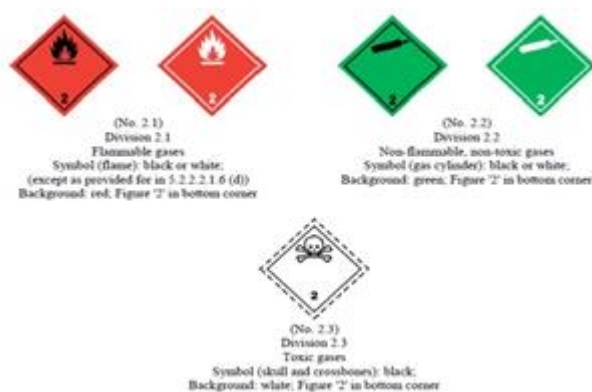


Figure 2. Class 2 dangerous goods labels.

- c. *Class 3 (flammable liquids), RFL* – A flammable liquid is defined by the dangerous goods regulations as a liquid, a mixture of liquids or liquids containing solids in solution or suspension which emit flammable vapours (having a flash point) at a temperature not exceeding 60-65°C, a liquid offered for carriage at a temperature equal to or above its flash point or a substance transported at high temperatures in a liquid state and which emits flammable vapours at a temperature equal to or below the maximum carriage temperature. Included in this RFL are paint, alcohol, adhesives, acetone, and petroleum.
- d. *Class 4 (flammable solids)* – Included in this class are: (1) flammable solids, for examples matches, sulfur, celluloid, and nitronaphthalene; (2) substances which are liable to ignite spontaneously, for examples white or yellow phosphorus, magnesium, and diamides; and (3) substances which, when exposed to water, emit flammable gases, for examples calcium carbide and sodium.

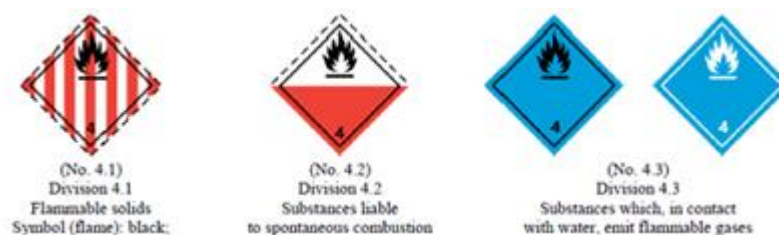


Figure 3. Dangerous goods class 4 labels.

- e. *Class 5 (oxidizing agents and bleaching agents)* – A substance that can cause or contribute to combustion, usually by producing oxygen as a result of a redox chemical reaction. Organic peroxides are substances that can be considered as derivatives of hydrogen peroxide in which one or two hydrogen atoms of the chemical structure have been replaced by organic radicals. This class has two divisions: (1) oxidizing agents, such as bleaches (including ammonium nitrate, fertilizers, calcium chlorate, and bleach), and (2) organic peroxides.



Figure 4. Class 5 dangerous goods labels.

- f. *Class 6 (toxic and infectious substances)* – Substances that are capable of causing death or serious injury or being hazardous to human health if swallowed, inhaled, or through skin contact. Infectious substances are substances that are known or suspected to contain pathogens. The dangerous goods regulations define pathogens as microorganisms, such as bacteria, viruses,

rickettsiae, parasites, and fungi, or other agents capable of causing disease in humans or animals. The class has two divisions: (1) toxic substances, and (2) infectious substances.

- g. Class 7 (radioactive materials) – The dangerous goods regulations define radioactive materials as materials containing radionuclides whose activity concentration and total activity exceeds a specified value. Radionuclides are atoms with unstable nuclei and as a result undergo radioactive decay.

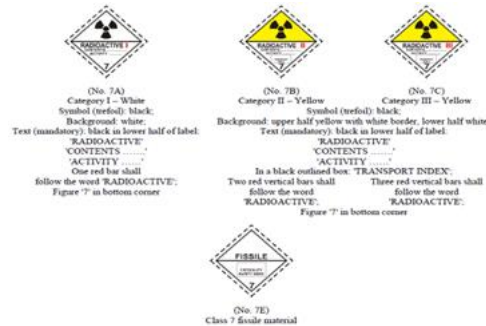


Figure 5. Dangerous goods class 7 labels.

- h. Class 8 (corrosive materials), RCM – These are substances that through chemical action degrade or destroy other materials on contact. The class includes battery acid, sulfate, sodium hydroxide, potassium hydroxide, and mercury.
- i. Class 9 (other dangerous goods) – Materials and goods that during transport pose a hazard or danger that is not included in other classes. This class includes, but is not limited to, environmentally hazardous materials, materials transported at high temperatures, various goods and substances, genetically modified organisms and microorganisms and (depending on the method of transport) magnetic materials and substances regulated by aviation. The class includes RMD (for example: asbestos, garlic oil, rafts, internal combustion engines) and RSB (for example polymer beads).

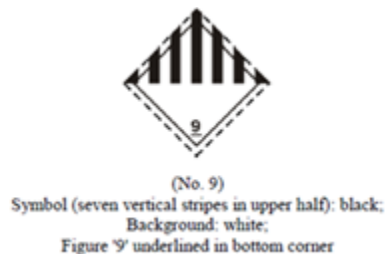


Figure 6. Class 9 dangerous goods labels.

Research Methodology

In this study the authors use a qualitative research method.

Research design. This research design uses a descriptive qualitative approach, according to Komariah [1] qualitative research methods are research that uses methods, steps, and procedures that involve more data and information obtained through respondents as subjects who can express their own answers and feelings to obtain a holistic overview of something being studied. The type of research used by the author in this study is descriptive qualitative research. Because in conducting research, the author describes data in the form of words, regarding the Comparative Study of Handling Dangerous Goods on Airlines Operating at Soetta International Airport. This research was conducted based on the reality or facts that occurred in the field.

Data collection techniques. According to Sugiyono [2], data collection techniques or methods can be carried out through interviews, questionnaires, observations or a combination of the three. This technique is a systematic and standard procedure for obtaining primary and secondary data.

1. *Observation* – Observation is a data collection technique that has special characteristics when compared to other techniques, observation is also not limited to people, but to objects that are the background of the research. Observation techniques are methods used by researchers to collect data, where the author conducts research by making direct observations in the field by directly seeing the research objects being carried out and assisted by other standard tools for the benefit of the research.

2. *Interviews* – The interview technique used by the author in this study is a semi-structured interview. Semi-structured interviews is included in the category of in-depth interviews, where semi-structured interviews are conducted by asking questions freely compared to structured interviews but still within the interview guidelines that have been made.

The author conducted semi-structured interviews with three officers. Table 1 lists the names of the employees interviewed.

Table 1. Airport authority employee

No	Officer name	Position
1.	Akhmad Hoirul Anwar	Skilled Aircraft Operation Assistant (FOO Inspector)
2.	Roni Ruslan Affandi	Young Expert Aviation Security Inspector
3.	Mahatir Muhammad Kargi	Data Collection and Processing Report (FO Inspector)

3. *Documentation* – Documentation is a record of past events in the form of writing, pictures, or monumental works from someone. Documentation is a method used by researchers to conduct investigations using documents with accurate evidence from recording information sources. Documentation is a method used to obtain data and information in the form of books, archives, documents, writings, numbers and pictures in the form of reports and statements that can support research [2].

Data analysis techniques. *Data collection* – Obtaining data and information through direct interviews with sources, conducting direct observations in the field or documentation then combined in research notes that include two aspects, namely: Descriptive Notes and Reflection Notes.

Data reduction – Reduction is a selection process, which decides attention to the steps of simplification, abstraction and transformation of raw data that the author obtains during research in the field. The data reduction that the author means is to conduct selection, make summaries, classify, sharpen, and discard data that is not needed in this study, and organize data so that it is easier to understand to make the right decisions.

Data presentation – Data testing is carried out to make it easier for the author to see the results of the research conducted. With the large amount of data obtained, researchers can make it difficult for the author to see a picture of the research results or at the decision-making stage, because the research results are still stand-alone data.

Drawing conclusions. – Drawing conclusions is an effort to find or understand the meaning of regular patterns, causal flows, or proportions.

Results and Discussions

In Indonesia, regulations governing Aviation Security, especially the transportation of dangerous goods, are regulated by various laws starting from Law No. 1 of 2009 concerning Aviation, Annex 18 concerning Safe Transport of Dangerous Goods by Air, PM 32 of 2022 concerning Civil Aviation

Safety Regulations (PKPS) section 92 concerning Safety of Transportation of Dangerous Goods by Aircraft, KP 128 of 2017 concerning Programs and Procedures for Supervision and Investigation of Safety of Transportation of Dangerous Goods by Aircraft, supported by several of these regulations, considering how important aviation safety and security are, of course, awareness from various parties is very important, especially operating airlines to participate in supporting and complying with these regulations.

The implementation of dangerous goods handling tasks must be carried out in accordance with applicable regulations referring to the Standard Operating Procedure (SOP), Handling of Dangerous Goods as follows:

SOP for handling dangerous goods by aircraft according to Ministry of Transportation (Republic of Indonesia) [3]: (1) Restrictions / policies on the transportation of dangerous goods; (2) Acceptance of dangerous goods; (3) Storage of dangerous goods; (4) Loading and placement of dangerous goods on aircraft; (5) Notification to Captain (NOTOC); (6) Protection of dangerous goods from damage; and (7) Provisions for Passengers and aircraft personnel carrying dangerous goods.

Citilink implements the Ministry of Transportation's SOP in manual form as follows: (1) Receipt of dangerous goods; (2) Marking and labeling; (3) Packaging; (4) Storage; (5) Separation of dangerous goods; (6. Storage); (7) Loading and unloading; (8) Radioactive materials; (9) Dangerous goods in ULD; (10) Dangerous goods in mail; (11) Receipt of category B substances; (12) Receipt of Commodity ID 8000; and (13) Receipt of lithium batteries

Meanwhile, Lion Air implements the Ministry of Transportation's SOP in manual form as follows: (1) Penerimaan barang berbahaya; (2) Penyimpanan dan pemisahan; (3) Pemuatan kedalam pesawat; (4) Penurunan dari pesawat; and (5) Pengangkutan material (COMAT).

Referring to Law No. 1 of 2009, Annex 18, PM 32 of 2022 [3], and KP 128 of 2017, the author will explain the results of observations on how Citilink and Lion Air airlines carry out Dangerous Goods Handling.

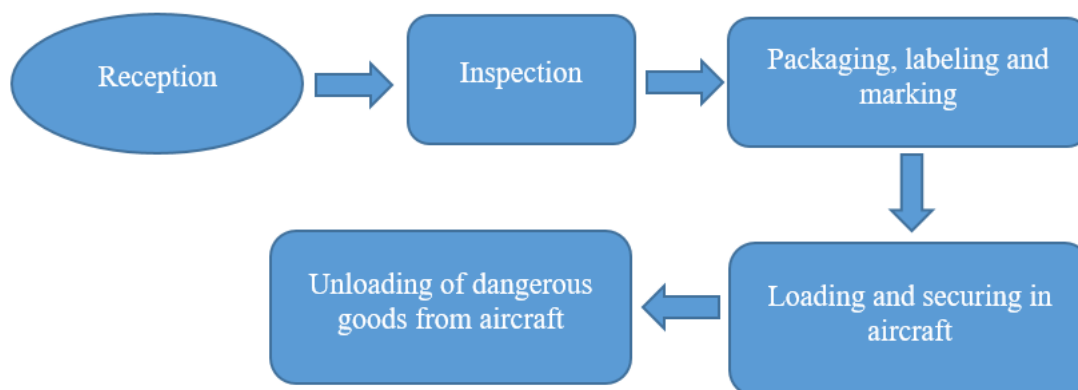


Figure 7. Dangerous goods handling flow

From the results of data collection that the author has carried out at the Class I-Soekarno Hatta Airport Authority Office within a period of 1 month, namely with technical interviews and documentation. The interviews that the author carried out were with semi-structured interview techniques, namely by interviewing 3 sources, including the first on behalf of Mr. Akhmad Hoirul Anwar as the assistant for the operation of the military aircraft, the second to Mr. Roni Ruslan Affandi as a young Expert Aviation Security Inspector, then the third to Mr. Mahatir Muhammad Kargi as the collection and processing of report data.

Observation. Table 2 shows observation results in accordance with Ministry of Transportation

Regulation No 32 of 2022 concerning Civil Aviation Safety Regulations Part 92 on the safety of transporting dangerous goods by aircraft [3].

Table 2. Observation results

No	Observation Aspect	Implemented		Information
		Yes	No	
1	Air transportation service needs	✓		Implemented
2	Aviation safety	✓		Implemented
3	Aviation security	✓		Implemented
4	Flight smoothness	✓		Implemented
5	Supervision and control of handling of dangerous goods	✓		Implemented
6	Suitability of SOP	✓		Implemented

Interview. Interviews were also conducted to obtain data for this study. The results of the interviews are listed in Table 3.

Tabel 3. Interview result

No	Author	Resource Person
1	Are there any differences in handling dangerous goods between Citilink Indonesia and Lion Air?	In handling dangerous goods, each airline uses the guidelines in PM 32 of 2022 concerning Handling of Dangerous Goods. There may be differences in the sub-chapters, but all are in accordance with the applicable SOP.
2.	Is the handling in each airline in accordance with the Dangerous Goods Standard Operating Procedure (SOP)?	Yes, for the company's own SOP, there is usually a refresh every year.
3	Why is Marking and Labeling needed when handling dangerous goods?	Labeling and marking are technical safety standards in the transportation of dangerous goods, so Citilink requires all hazard class labels to be in accordance with section 7 of the IATA dangerous goods regulations. This indicates the precautions that must be taken in handling or storing an item.
4	Why is there a difference in packaging dangerous goods?	The packaging used for dangerous goods must be in accordance with the contents and resistant to chemicals or reactions to other goods. For example, the packaging used for dangerous goods in the form of liquid goods must be positioned upright, without any leaks, and resistant to pressure. Meanwhile, the packaging of dangerous goods using inner packaging must be packaged safely and equipped with retaining materials to control movement to prevent damage and leakage.
5	Why is Lion Air's handling simpler than Citilink's?	In handling dangerous goods, Lion Air airlines are in accordance with the applicable SOP, namely based on PM 32 of 2022
6	What are the things prepared in handling dangerous goods?	Aircraft operators who will transport dangerous goods are responsible for: 1. carrying out acceptance according to the technical instructions for the safety of dangerous goods by aircraft,

		2. providing storage or stacking space and compiling a system, 3. carrying out loading, 4. having handling personnel, 5. giving authority to personnel who will carry out acceptance and supervision of loading/unloading, 6. having a shipper list, 7. regular supervision, 8. preparing loading and placement procedures, and 9. preparing personnel training programs.
7	What capabilities must be prepared in handling dangerous goods?	Personnel handling the transportation of dangerous goods must have a certificate of competency and/or authorization. This certificate can be obtained through a training institution for personnel handling dangerous goods.
8	Is retraining required for personnel in the maturity of handling dangerous goods?	Personnel handling the transportation of dangerous goods must undergo training for personnel handling the transportation of dangerous goods by aircraft for the training itself, there are usually 2 categories, namely initial training and refresher training (recurrent training).
9	How is supervision carried out?	The implementation of supervision activities starts from the opening meeting, implementation of supervision, daily briefing, preparation of draft findings and recommendations, and closing meeting.

Based on the results of interviews with related sources, it can be concluded that both airlines, namely Citilink and Lion Air, have met the SOP for handling dangerous goods.

Handling of dangerous goods for Citilink and Lion Air Airlines – The implementation of handling dangerous goods on airlines has a significant impact on flights. Dangerous goods reception staff are sufficiently trained to be able to identify and detect dangerous goods in accordance with the provisions of the IATA (International Air Transport Association) Dangerous Goods Regulations and strictly follow the latest IATA Dangerous Goods Checklist Form guidelines. When receiving dangerous goods at the warehouse from each area, it is mandatory to provide a special place for receiving dangerous goods that cannot be combined or equated with the place of receipt with general cargo. Ensure that Company Materials that are classified as dangerous goods, are transported as cargo on board aircraft, packed, marked, labeled, declared and received, stored, secured and unloaded in accordance with technical instructions. Both Citilink and Lion Air will conduct in-depth inspections when receiving Transportation Equipment or types of pallets containing consumer goods, dry ice or magnetic materials as permitted.

From the results of direct interviews in the field from the three sources, it can be concluded that the handling of dangerous goods must be in accordance with the (SOP) Standard Operating Procedure in each agency that refers to IATA. Every officer involved in handling dangerous goods must also undergo training at least once every two years, in order to repeat the material so that they are sufficiently mastered.

Maximum effort in handling dangerous goods – The results of direct interviews in the field with the three sources regarding efforts to maintain the handling of dangerous goods are to hold training at least once every two years, then before carrying out the work, officers conduct inspections, readiness, minimize accidents by conducting identification at the beginning. Then for anticipatory steps against danger, officers usually recheck before and after handling. In handling dangerous goods, each officer must understand and comply with the SOP, and remind each other.

Conclusion

1. From the results of the research on the comparative study of handling dangerous goods on Citilink and Lion Air airlines operating at Soekarno-Hatta International Airport that the author has conducted, in connection with the very high risk, carrying out tasks according to SOP is a must. Every officer must be monitored while working. That is why training in handling dangerous goods on aircraft is the main requirement for officers involved.
2. Based on the results of the study, training is conducted at Citilink and Lion Air airlines once every two years in an effort to maintain safety and security when handling dangerous goods. In addition, officers then always recheck their actions for anticipatory steps if there is negligence.

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