THE INTERNATIONAL CARRIAGE OF DANGEROUS GOODS BY AIR IN THAILAND

BY

MISS PRAEWPUN SUTITRERATANAKUL

A THESIS SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF LAWS IN BUSINESS LAWS (ENGLISH PROGRAM)

FACULTY OF LAW

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ABSTRACT

In recent years, the carriage of goods by air in Thailand has increased and continues to rise because the transportation by aircraft is widely used. The carriage is not only limited to general goods but also includes chemicals and raw materials which are categorized as dangerous goods. Such increase in activity and demand results in several issues which consist of the carriage routes having to pass through communities followed by the increase in risks of collateral damage from accidents caused by the goods.

Hence, owing to the problem on the carriage of dangerous goods, international organizations made regulations to control the carriage of dangerous goods in order to prevent damage instead of specifying the remedy.

Therefore, it is crucial to enact the law and regulatory measures that control and monitor the carriage of dangerous goods as well as limit the accidental damage as low as possible in order to ensure the safety for both the public and the activity itself.

The objective of this thesis is to study the means of enacting a specific law governing the regulation of the carriage of dangerous goods by air. The methodology includes study and comparative analysis of the international regulations, namely United Nations Recommendations on the Transport of Dangerous Goods, IATA Dangerous Goods Regulations, Annex 18 of Chicago Convention, and Technical

Instructions for the Safe Transportation of Dangerous Goods by Air, Foreign Laws and Thai law that concerns and governs the carriage of dangerous goods.

According to a study, it is evident that Thai law governing the carriage of dangerous goods by air is still inadequate due to the insufficiency of the regulations. In addition, it does not meet the requirement of ICAO; both legal and practical.

Such issues lead to a necessity in amending the related law. To make the law appropriate for the current social and economic state, the author suggests the resolution of these issues by enacting the specific law and amending the general rules as well as transportation and penalty rules stated in the same act in order to fit with the current situation and be sufficient for enforcement.

Keywords: carriage, dangerous goods, by air

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Miss Praewpun Sutitreratanakul
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2015

TABLE OF CONTENTS

CHAPTER 1
INTRODUCTION

1.1 Background

Over the years, agricultural and industrial sectors have grown rapidly, and both of these sectors deal with chemicals and raw materials, in some way or the other. The importation and exportation of chemicals or hazardous materials come within the ambit of dangerous goods. In the carriage of dangerous goods, one should be more careful because it can cause harm to life, property, and environment. To prevent this damage, it is crucial for the government to impose statutory and regulatory measures to control and monitor the carriage of dangerous goods as well as limit the accidental damage as low as possible to ensure the safety for both; the public and the activity itself.

Due to rapid development in the world, the demand for these dangerous goods has also increased exponentially. These dangerous goods are necessary for a variety of global commercial, medical, industrial and research processes and requirements. Because of the obvious advantages of air carriage, great deal of these dangerous goods are transported by the aircrafts.

With an increasing demand of dangerous goods, the role of air transportation in their carriage is becoming more important than ever. Since they are transported every day by air around the world, there is an International Standard that the contracting states of Chicago Convention have to apply in their respective national legislations to ensure the safety of the aircrafts. This, in turn, ensures that the carriage of dangerous goods has been controlled within the safety standard, thereby providing a worldwide harmonization in aviation.[1]

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[1]International Civil Aviation Organization, "*The Transport of Dangerous Goods by Air*", http://www.icao.int/safety/DangerousGoods/Pages/background.aspx (last visited Jan. 4,2016).

To understand the background of the carriage of dangerous goods, we first need to understand the definition of dangerous goods, the difference between dangerous goods and hazardous material and the principle in the carriage of dangerous goods.

Dangerous goods are the articles which can cause harm to the aircraft if they are carried and therefore must be forbidden if these are not in compliance with specific instructions on the packaging, carrying, stowage location, proximity to the other items, or class of flight.[2]

The problem in Thailand is that there is no specific law to specify dangerous goods. Hazardous Substance Act, B.E 2535 is the only statute which concerns production, import, and export of hazardous substances but it does not specify their carriage. Moreover, there is no specific organization responsible for measuring and certifying the packaging of dangerous goods as normally they have to be approved by UN Mark.

The carriage of dangerous goods by the airline in Thailand still does not meet the requirements of ICAO (International Civil Aviation Organization) and has resulted in the issuance of Significant Safety Concerns (SSC) by ICAO. Since Thailand does not have any distinct regulation on the carriage of dangerous goods by airlines, it should be concerned about this matter and comply with the international regulations such as Annex 18 of Chicago Convention which states about the procedure, inspection, training and emergency procedures.[3] For these reasons, more attention should be paid on the carriage of dangerous goods by air in both legal and practical sense.

Annex 18 of the Chicago Convention, the Safe Transport of Dangerous Goods by Air covers all of the features in this matter. The carriage of dangerous goods

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[2] *"Definition of Dangerous Goods"*, http://www.skybrary.aero/index.php/Dangerous_Goods (last visited Jan. 4, 2016).

[3] Thaipublica, *"การดำเนินการแก้ไขปัญหามาตรฐานการบิน"("The Resolve of Civil Aviation Problems")*, http://thaipublica.org/2015/06/icao-4/ (last visited Jan. 4, 2016).

should be applied with the same standards as provided under the Technical Instructions for the Safe Transport of Dangerous Goods by Air, known as "Technical Instructions". All Contracting States are required to comply with the principles of Annex 18 to ensure that Dangerous Goods that are transported meet the necessary requirements.[4]

The Thai government has the requisite policy to support all transportation. However, the regulations on the carriage of dangerous goods by air in Thailand are not enough and it affects the potential in transportation and also the responsible organization. To solve this problem, Thailand should strictly comply with the international regulations which are regulated by "UN Recommendations on the Transport of Dangerous Goods", a model regulation to control all carriage system.

Thailand should also consider it imperative to have a specific law to handle the carriage of dangerous goods by air which covers all aspects on this matter. This thesis will focus on the related law in Thailand as compared to the international regulation and foreign law for support so as to make it suitable to regulate the law on the carriage of dangerous goods by air in Thailand.

1.2 Objectives of study

In Thailand, the regulations governing the carriage of dangerous goods by air are insufficient. Hazardous Substance Act, B.E 2535 is the only statute that is familiar with dangerous goods but it does not distinctly specify their carriage, resulting in many practical problems. Therefore, objectives of this thesis consist of the following;

Firstly, to explain the definition and categories of the dangerous goods, and the difference between hazardous substances and dangerous goods.

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[4]International Civil Aviation Organization, *"Annex 18"*, http://www.icao.int/safety/DangerousGoods/Pages/annex-18.aspx (last visited Jan. 4, 2016).

Secondly, to study the law and regulation on this subject such as UN Recommendations on the Transport of Dangerous Goods, Technical Instruction and Annex 18 of Chicago Convention.

Thirdly, to critically analyze the legal and practical problems in the carriage of dangerous goods by air in Thailand as compared to foreign laws.

Lastly, to find a solution and related legal remedies in order to apply the carriage of dangerous good by air in Thai law.

1.3 Hypothesis

The carriage of dangerous goods has more important role all over the world than the past, especially by air. However, the regulations concerning the carriage of dangerous goods by air in Thailand are inadequate. Therefore, it is highly imperative to have a specific law to handle and solve some problems that happen in practice and improve them to meet the requirements of the international regulations. Thus, an amendment to the present law on the carriage of dangerous goods is required.

1.4 Scope of study

This thesis will cover the carriage of dangerous goods by air which means the dangerous goods that are carried on passenger flights. Such dangerous goods include carry-on items onboard, check in items and all dangerous goods that are loaded in the cargo compartment (one part of the aircraft under the cabin).

This thesis will also explain the difference between hazardous substances and dangerous goods, importance and some problems in the carriage of dangerous goods by air and the legal and practical solutions to these problems.

Moreover, this thesis will focus on legal principles which deal with the carriage of dangerous goods by air in Thai law while comparing them to foreign laws. This thesis also intends to analyze the conventions and related laws that can be applied to Thai law.

1.5 Methodology

This thesis will be conducted based on documentary research method both Thai and English, using texts and documents as source materials including books, articles, websites and electronic data. Thai and foreign laws and the convention will be referred to as part of necessity for comparative aspects.

1.6 Expectations and Recommendations

1. To understand the concept of the carriage of dangerous goods by air.
2. To study the principles related to the carriage of dangerous goods by air under International Law and related law in Thailand.
3. To provide information and legal analysis about the carriage of dangerous goods by air.
4. To suggest appropriate legal measures and recommendations in order to apply Thai law along with the requirements of the international regulation and convention.

CHAPTER 2

BASIC CONCEPTS OF DANGEROUS GOODS

2.1 The Importance of International Civil Aviation

International civil aviation has become one of the most closely regulated activities in the world. Practically all its activities are related to the operations of international air services and the carriage of goods. With the continuous development of civil aviation and airline operations, the existing regulations and authorizations have to be continuously adapted to meet the new situations.

There are mainly two ways to regulate international civil aviation:

A) agree on common general principles and apply these principles to the operation of international air services; or

B) for individual states to try and enlarge their sphere of influence in international civil aviation by any available means.[5]

2.2 Definition

2.2.1 Definition of Dangerous Goods

UN Recommendations on The Transport of Dangerous Goods define the meaning of dangerous goods as "articles or materials that can cause damage or injury to human, health, property, or environment when transported in a sizeable amount". It also covers the items of daily use, for example, perfumes, paint, can, etc.

Even though most of the transport regulations are now framed so as to adhere to basic principles under the UN Recommendations, but the regulations for the road,

[5] H.A. Wassenbergh, **"Public International Air Transportation Law in a new era"**, Henkes Senefelder, (1997).

air, rail, and sea vary as per the specific requirements of different modes of transportation.[6]

Many common items from the workplace and home, together with many of industrial chemicals and substances, can injure a passenger, an airline employee and the aircraft. Everyday items that can cause problems include toiletries, aerosols, tools and lithium batteries. To minimize the danger from these articles, the government and airlines have to establish regulations to handle and control dangerous goods.

IATA defines dangerous goods as "substances or articles which can pose a risk to safety, health, environment or property" and has listed several items that can be categorized as dangerous goods in its IATA Dangerous Goods Regulations or has classified them in the regulations.

However, air transportation has additional characteristics such as pressure vibration and temperature changes etc., which can have an adverse effect on the package during transportation by air that is not visible on the ground. Resultantly, there are further precautions which have to be applied when transporting dangerous goods by air. These precautions are crucial as any risk to the aircraft, cabin crew and passengers posed by the dangerous goods can be reduced or eliminated, if adhered strictly to.

Some of them are essential to be carried on an aircraft for their airworthiness or operation. Such items include:

- aircraft fuel;
- batteries;
- fire extinguishers; and
- life rafts.

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[6] UN Recommendations On The Transport Of Dangerous Goods, *"Definition of Dangerous Goods"*, http://www.businessdictionary.com/definition/dangerous-goods.html (last visited Jan. 4,2016)

Duty-free goods, such as perfumes and alcoholic beverages are needed for cabin service during the flight. The aircraft operator is exempted from the provisions of the regulations when carrying such items.

More importantly, if the risk can be identified then it may often be eliminated, in which case the transport by air can be accomplished safely by maintaining strict controls and responsibilities.

2.2.2 The Difference between Hazardous Substances and Dangerous Goods

In general, Hazardous Substances mean "substances that are released in water, soil, atmosphere and which, in direct contact with the eyes, skin or mucous membranes, or as additives to food, can cause health risks to humans or animals through inhalation, absorption or ingestion". [7]

In Thailand, Hazardous Substance Act B.E. 2535 has defined the definition of hazardous substances that mean "substances or materials as announced under this Act. Such substances are divided into ten classes. Hazardous substances can pose a risk to human, safety, and property when in commercial transportations, and also have been defined as hazardous. They include a hazardous substance, marine pollutant, hazardous waste and elevated temperature material".[8]

Dangerous goods are divided on the basis of chemical and physical effects, for instance, explosive, flammable, oxidizing, toxic, corrosive or water-reactive. Accidents occurring on account of contact with dangerous goods may cause serious damage to people, property or environment. The effects of such accidents may be seen instantly, for example, dizziness, nausea or vision, and skin impairment, or the symptoms may take several years before becoming prominent, such as cancer. An

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[7] Frank R. Spellman, **"Environment Health and Science Desk Reference"**, Government Institutes, 2012.

[8] Hazardous Substance Act B.E. 2535, Section 4

identification of such dangerous goods can be done by ‘diamond symbols’ in a different color at the workplace or when in transport.[9]

Hazardous substances and dangerous goods are used in the different context. The definition of Hazardous substances is wider than dangerous goods. They are classified based only on health effects in immediate or long term, it can be any substance, whether solid, liquid or gas, that may cause harm to your health. While Dangerous goods are the international term used by ICAO and IATA, they are classified according to their immediate physical or chemical effects, affect to people, environment or property.

The regulations for the transport of Dangerous Goods are UN Recommendations on the Transport of Dangerous Goods, IATA’s Dangerous Goods Regulations and ICAO Technical Instructions. The principles of these regulations consist of transportation, handling, labeling and packaging of dangerous goods.

2.3 General Principles in the Carriage of Dangerous Goods

2.3.1 Classification of Dangerous Goods

Dangerous Goods are classified based on the standard determined by the “United Nations Committee of Experts” (CoE). This classification determines the acceptability of the articles and substances for air transportation as well as the conditions for their transportation. It is the duty of the shipper of the cargo to decide if the articles and substances are dangerous goods or not, and if dangerous goods, to determine the correct class or division.

UN Recommendations on the transport of dangerous goods divide dangerous goods into 9 classes, reflecting the kind of risk involved. In some cases, these classes

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[9] Victoria State Government, *“Hazardous substances and Dangerous Goods”*, http://www.education.vic.gov.au/school/students/beyond/Pages/hazsubdangerousgoods.aspx (last visited Jan. 4, 2016).

are further sub-divided into divisions to identify a particular risk within that class. In such cases, reference is made only to division and not to the class.

Classes are expressed by single-digit numbers. For example, Class 7. Divisions are expressed by 2-digit numbers. The first digit identifies the Class number and the second identifies the variation within the class. For example, Oxidizer is Class 5, Division 2, and is referred to as "Division 5.1".

The order in which the classes and divisions are enumerated is simply for convenience and does not indicate a corresponding level of danger, which means that Class 1 is not necessarily more dangerous than Class 2 or 3, etc.

Each class or division has a particular criterion which is used to decide whether an article or substance belongs to that class or division. These criteria are technically detailed and classification of an item requires specialist knowledge of the criteria.

These classes are;

1) Explosive
2) Gas
3) Flammable Liquid
4) Flammable Solid
5) Oxidizing Substance
6) Toxic and Infectious Substance
7) Radioactive Material
8) Corrosive
9) Miscellaneous Dangerous Goods[10]

Class 1 – Explosive

Class 1 is a strictly regulated class. Only certain kinds of explosives that have been specified are deemed suitable for transport. Nevertheless, the personnel may

[10] UN Recommendations on the Transport of Dangerous Goods, *"The 9 Classes of Dangerous Goods"*, http://www.dgiglobal.com/classes (last visited Jan. 4, 2016).

permit the carriage of explosive substances in a special case by way of mutual agreements with the carrier. Class 1 can cover an explosive article, pyrotechnic substance or explosive substance.

They can be categorized into the following divisions;

(1) Substance or article that has a massive explosion hazard

(2) Substance or article having a projection hazard but not a massive explosion hazard

(3) Substance or article that has a fire hazard and a blast hazard or a minor projection hazard

(4) Substance or article that does not present significant hazard; but only a few hazards in the event of combustion or installation during transport with the effects generally confined to the packing

(5) Insensitive substance that has a massive explosion hazard

(6) Extremely insensitive article that does not have a massive explosion hazard[11]

Class 2 – Gas

Gas can be defined as "a substance which, at the temperature of 50°c has a pressure more than 300 kPa or a substance which becomes completely gaseous at 20°c. Gasses can be carried in accordance with their states, such as compressed gasses, liquid gasses, liquid gasses at low temperature and dissolved gasses".

They can be divided as follows;

(1) Flammable gas

(2) Non-flammable or non-toxic gas

(3) Toxic gas[12]

Class 3 - Flammable Liquid

[11] UN Recommendations on the Transportation of Dangerous Goods (11th Ed, 2000)

[12] *Id.*

It can be defined as a liquid, mixture of liquids or liquid in solid suspension or solution which does not have a flash point over 60.5 °c by closed cup testing and at the temperature of 65 °c by open-cup testing. In addition, it also includes the liquids that have to be carried at the same temperature or greater than the flash point of those liquids or the substances that have to be carried only in liquid status and that gives off the flammable vapor at the same or lower than the maximum temperature in transport.

For class 3, there is no subdivision.[13]

Class 4 - Flammable Solids

Substances that are flammable when in contact with water and other combustible substances.

Flammable solid is solid which is easily combustible during transport or may undergo combustion due to friction; or due to other substances that can be reactive by themselves.

Combustible substances are the substances which can emit heat spontaneously even in ordinary circumstances during transportation, or may heat up when in contact with air.

Substances that can be flammable when in contact with water mean that when these substances come into contact with water, they can catch fire or emit flammable gasses in quantity.

They can be divided as follows:

(1) Flammable solid

(2) Substance which is likely to combust spontaneously

(3) Substance when in contact with water, will discharge flammable gas[14]

Class 5 - Oxidizing Substance or Organic Peroxide

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[13] *Id.*

[14] *Id.*

An oxidizer can be defined as “a substance that in itself need not necessarily be combustible, but which by producing oxygen, may cause or contribute to the combustion of other material. An example is a generator that produces oxygen by chemical reaction”.

Organic Peroxide is “a substance that can explode upon decomposition, rapidly burn, can cause a reaction even upon slight friction, is reactive with other substances and can impair vision. Hydrogen Peroxide may be considered as an example of organic peroxide”.

They can be divided as follows:

(1) Oxidizing substance

(2) Organic peroxide[15]

Class 6 - Toxic or Infectious Substance

Toxic Substance is “any substance that can cause serious damage, death or cause injury to the health by breathing, swallowing or contact with skin”.

Infectious Substances are “the substances that have diseases, viruses, bacteria, fungi or rickettsia that cause injury to humans and animals.”

They are divided as follows:

(1) Toxic substance

(2) Infectious substance[16]

Class 7 - Radioactive Material

It can be defined as “a material that contains radionuclide which in concentration and total activity exceeds certain specified values”.

For class 7, there is no subdivision.[17]

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[15] UN, *supra* note 11.

[16] *Id.*

[17] *Id.*

Class 8 Corrosives

Corrosives are “the substances that, upon reaction with chemicals can cause serious damage when in contact with the tissues of living things or if leaked, can cause damage to the goods and the transportations”.

For Class 8, there is no subdivision.

Class 9 Miscellaneous Dangerous Goods

Miscellaneous Dangerous Goods are “the articles and substances that can be found dangerous during transportation, and are not covered in other classes. This class includes the substances that specify the temperature equal or more than 100°c in a liquid state or 240°c in a solid state in transportation”.

For Class 9, there is no subdivision.[18]

While the classifications describe the types of danger certain kinds of substances present, there is another classification called “Packing Group” or “PG”. It indicates the danger level. Packing group can be classified into 3 types as following;

PG I - It is the most dangerous

PG II - It is at a moderate danger level

PG III – It is the least dangerous[19]

Packing Groups are always written in Roman number and are different from the class number. There is a possibility for a substance to have multiple packing groups, depending on the danger it presents, and the concentration of the substance. An example for this can be concentrated sulphuric acid, which is in Class 8, packing group II, while a dilute solution of the same acid, that may be exchanged as a drain

[18] *Id.*

[19] VCA Offices, *“What are Dangerous Goods?”*, http://www.dft.gov.uk/vca/dangerousgoods/what-are-dangerous-g.asp (last visited Jan. 4, 2016).

cleaner, is designated to Class 8 since it is less corrosive and can be in packing group III.[20]

2.3.2 Limitation of the Carriage of Dangerous Goods

Some of the dangerous goods are too hazardous to be carried on the aircraft. They have to be carried on the cargo aircraft only, while others are acceptable on the passenger and cargo aircrafts. An amount of limitations is laid on dangerous goods which are allowed to be carried by air. The limitations were set up by IATA Dangerous Goods Regulations. Furthermore, both operators and states may enforce additional restrictions which are called "variations".

Dangerous goods may be divided into four categories:

1) Those which are accepted for transportation by air, provided all the provisions of the Regulations are complied with;
2) Those which are prohibited for transportation by air under any circumstances;
3) Those which are prohibited for transportation by air except the ones exempted by the State concerned;
4) Those which are other than the ones provided in the conditions of the Regulations.[21]

(1) Acceptable Dangerous Goods

Great many dangerous goods may be carried on aircraft as cargo, provided they are properly prepared for transportation according to the Regulations. The list of Dangerous Goods itemizes the most commonly shipped dangerous goods by name and indicates the maximum quantity of such goods permitted per package on passenger or Cargo Aircraft. Those dangerous goods that are limited to the cargo aircraft are either in larger amounts or are prohibited on the passenger aircraft. [22]

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[20] *Id.*

[21] International Civil Aviation Organization, **"Cabin Crew Manual"**, (2012)

[22] *Id.* at 2-41.

Generally, however, they are not accepted in passenger and crew checked in baggage or carry-on items. Items that are forbidden as baggage may be accepted as cargo, provided the substances or articles are prepared in compliance with all conditions of the regulations.[23]

(2) Dangerous Goods Forbidden Under Any Circumstances

Some dangerous goods are considered to be too hazardous for transportation by air under any circumstances. Special care is taken to ensure that such goods are not accepted for transport.

Substances or articles that, as visible for transport, are likely to explode, have a dangerous reaction, produce flames or dangerous emissions of heat or toxins, flammable gasses or corrosives or vapors under any condition encountered in transportation are not allowed to be carried on the aircraft under any circumstances.[24]

(3) Dangerous Goods Forbidden Unless Exempted

Certain dangerous goods are considered to be too dangerous for transport by air under the normal course of events. However, in exceptional circumstances and under an exemption granted by the States concerned, these dangerous goods can be carried, provided the details of the government exemptions are complied with, in their entirety. Acceptance of dangerous goods offered under State exemption is at the discretion of the operator.[25]

The supplement to the ICAO Technical Instructions provides the States' competent authorities with details of acceptable quantities per package and acceptable packaging for any circumstances permitted under the exemption. This provides overall levels of safety, which are equivalent to the one provided by the dangerous

[23] *Id.* at 2-41.

[24] *Id.* at 2-42.

[25] *Id.* at 2-42.

goods regulations. The government exemption document shows the details of required packaging and accompanies the shipment.[26]

(4) Dangerous Goods Exempted

Certain items of dangerous goods have been exempted from the principles of the Regulations, for example:

- Dangerous goods which are carried by crew or passengers
- Dangerous goods by airmail
- Dangerous goods in acceptable quantity[27]

2.3.3 Dangerous Goods Carried by Passengers or Crew

To ensure the safe transportation of dangerous good by air, a number of essential requirements have to be met. It is more than just knowing what the Regulations state. It is about complying, without exception, with the Regulations and establishing a chain of safeguards and checks.[28]

Many everyday items that are considered as dangerous goods, and are required for practical reasons may, subject to certain controls, be carried by passengers and crew, either in person, packed in checked or carry-on baggage, and always in controlled quantities.[29]

These dangerous items have been exempted from the provisions of the Regulations when carried by passengers and crew, but they are still subject to specific provisions and limitations.

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[26] *Id.* at 2-43.

[27] *Id.* at 2-43.

[28] International Civil Aviation Organization, **"Dangerous Goods Training for Cabin Crew"**, (2016)

[29] *Id.* at 17.

There are also items that may be used by people for business or personal purposes that are forbidden for carriage by passengers or crew members. They include:

- Security equipment, for example, cash bag, cash box, etc. incorporating dangerous goods, for example, pyrotechnic material or lithium battery;
- Disabling devices, for example, a pepper spray, mace etc. containing an incapacitating or irritant substance;
- Personal oxygen devices which utilize liquid oxygen.[30]

Some dangerous articles and substances that are not permitted as carry-on or checked-in baggage may be shipped as cargo. As cargo, each package is subject to detailed inspection by the operator's dangerous goods acceptance personnel. The staff receives certified training in dangerous goods and is familiar with the requirements of the Regulations to such depth as to enable them to competently check both the package and the accompanying documentation.

This is also the start of an important communication process. The staff ensures that the goods have been safely stowed on the aircraft and the captain is notified in writing as to where the dangerous goods have been loaded and the packages are free from any damage or leakage.[31]

A) Dangerous Goods Permitted in Passenger Baggage

These tend to be everyday items of personal use, which are separated into three groups based upon three different requirements needed for their safe transport;

- Items that require the approval of the Operator and where the captain must be notified.
- Items that require the approval of the Operator and where the captain need not be notified.
- Items that do not require prior approval.[32]

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[30] *Id.*

[31] *Id.* at 18.

[32] *Id.*

B) Dangerous Goods Accepted in the Cabin

Passengers and crew can carry dangerous goods in their baggage for the personal use but there is a limit to their amount, such as;

- small lithium batteries contained in a portable electronic device
- toiletry items
- alcohol beverages, which contain less than 70% of alcohol
- dry ice etc.[33]

In each country, there are different security regulations to control the type of items that passengers can carry on the aircraft.

According to the airworthiness regulations, there are some dangerous goods including the emergency equipment that are permitted to carry on the aircraft including:

- O2 Bottles
- CO2 gas cylinders to inflate the life jackets
- Halon fire extinguishers etc.[34]

2.3.4 Dangerous Goods Accident and Incident

There are some differences between dangerous goods accident and incident. Dangerous goods accident is "an occurrence related to the carriage of dangerous goods resulting in serious or fatal injury to people or serious damage to properties".[35] While dangerous goods incident is "the occurrence apart from a dangerous goods accident associated with and related to the carriage of dangerous goods by air, not necessarily occurring onboard the aircraft, that results in injury to people, properties or environment, breakage, fire, leakage, spillage of radiation or fluid or other evidence

[33] *Id.* at 19.

[34] *Id.*

[35] Civil Aviation Authority, *"Report dangerous goods related incident or accident"*, https://www.caa.co.uk/Commercial-industry/Airlines/Dangerous-goods/Report-a-dangerous-goods-related-accident-or-incident/ (last visited Mar. 29, 2016).

that the unity of the package has not been maintained".[36] Dangerous goods accident is severely endanger the aircraft or its occupant and can cause more serious damage to people, property or environment than dangerous goods incident

2.3.5 Report Dangerous Goods Incidents and Accidents

When dangerous goods incidents or accidents occur, the operators have to report them to the authorities of the operator's state and the state where the accident or incident occurs in accordance with the report requirements of the competent authority.[37]

If the operators discover undeclared dangerous goods in the cargo, the operators have to report the occasion to the competent authority of the operator's state and the state where it occurred.

Moreover, if the operators find the prohibited dangerous goods in the passenger's baggage, they must report to the competent authority of the state where it occurred.[38]

2.3.6 Documentation when moving dangerous goods

In the carriage of dangerous goods, it is necessary to have the label and mark on the package together with the transportation documents accompanying the material. The transportation documents consist of the declarations of the nature and statement of the goods together with the details provided by the dangerous goods regulations suitable to the selected mode of the carriage.[39]

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[36] *Id.*

[37] International Civil Aviation Organization, *supra* note 21, at 50.

[38] *Id.*

[39] Department for Transport, "*Moving Dangerous Goods",* https://www.gov.uk/guidance/moving-dangerous-goods (last visited Mar. 29, 2016).

A proper declaration by the shipper should be done to inform everyone who is involved in the carriage so that they know what they are carrying and can ensure that the dangerous goods will be properly accepted, handled and loaded. Moreover, it can be ensured that the correct response will be taken when an incident or accident occurs.

A transport document has to be fulfilled by the sender, for example, the company or person from whom the goods have been received for transport. Regulation comprises the example of a transport document of dangerous goods and describes reasons when the document is not needed, for example, due to a limited quantity.[40]

2.3.7 Marking and Labeling

Packages are marked with required markings and bear the required labels to ensure that the hazards can be recognized without relying on accompanying documentation in case of an emergency.[41]

1) General Principles

Packages containing dangerous goods are normally recognized with specific marking and special hazard labels, intended to alert a person to the inherent risks of their contents. Correct marking and labeling of dangerous goods packages are important elements in the safe carriage process. Markings and labels fulfill the following general purposes:

- They specify the contents of the package;
- They specify that the package meets the standards;
- They specify the stowage and safe handling information;
- They specify the nature of the hazard.[42]

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[40] *Id.*

[41] International Civil Aviation Organization, *supra* note 28, at 40.

[42] *Id.*

A shipper is responsible for the correct label and mark of the packages presented for transport.

A cargo agent, freight forwarder and operators' dangerous goods acceptance staff are required to check and make sure that all packages are correctly marked and labeled before accepting the consignment.[43]

2) Marking

For each package and overpack containing dangerous goods that require marking, the shipper must:

- Check that the required marking is applied in the correct locations on the package and meets the quality and the specification requirement of the regulations;
- Ensure that where specification packaging is required, the specification markings are as specified;
- Remove or obliterate any irrelevant marking;
- Ensure that all the required markings have been applied when the package is presented to the operator.[44]

There are two types of markings:

- Marking which identifies the use of a particular packaging for a particular shipment. Every packaging of dangerous goods must be marked with the correct shipping name, ID or UN number, full name and address of both the consignee and shipper.
- Marking which identifies a design or specification of a packaging, when UN specification packaging is used.[45]

3) Specification markings

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[43] *Id.*

[44] International Civil Aviation Organization, *supra* note 21, at 40

[45] *Id.*

UN Specification packages are performance oriented and are subject to specified tests before they are permitted to bear the required marking. The required markings provide the user with the information as follow:[46]

4G – The package type code "4G" indicates a fiberboard box.

X – The packing group designator. X can be used for packing groups I, II and III, Y can be used for packing group II and III, Z only for packing group III.

10 – Indicates the maximum permitted gross weight, in kilograms, of the package.

S – Indicates whether the package is used for containing solids or for inner packaging.[47]

4) Labeling

Packages containing dangerous goods must be properly labeled to indicate their contents. There are 2 types of labels:

A) Hazard labels

"Hazard labels (in the shape of square), which are required for most dangerous goods in all classes".[48]

B) Handling labels

"Handling labels (in various rectangular shapes), which are required, either alone or in addition to hazard labels, for some dangerous goods".[49]

The shipper is responsible for labeling a package or overpack that contains dangerous goods. The airline or operator is responsible only for replacing the labels that become detached or unidentifiable during transport.

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[46] *Id.* at 41.

[47] *Id.*

[48] *Id.* at 42.

[49] *Id.*

Certain dangerous goods require special handling labels aside from the hazard labels, because they need to be loaded or handled in a particular manner. [50]

2.3.8 Dangerous Goods Emergency Response

Emergency procedures should be available when dangerous goods are handled. ICAO Annex 14 – Aerodromes, Chapter – 9 Emergency and Other Services, requires that airport authorities establish the procedures to deal with an emergency involving dangerous goods.[51]

Moreover, it is required that operations provide information to the flight crew and other employees in the operator's operation or other appropriate manual, on the action to be taken in case of an emergency relating to the dangerous goods.

An example of emergency information for flight crew in relation to dangerous goods is the "ICAO publication Emergency Response Guidance for Aircraft Incidents Involving Dangerous Goods", generally referred to as the "red book".[52]

1) General Procedures for Passenger Handling and Security Screening Personnel

The general procedure to be followed during a dangerous goods incident comprise the following:

- Notify immediate supervisor who may seek professional assistance.
- Identify the dangerous goods.
- Where safe to do so, remove other packages or property to isolate the package.
- Avoid contact with the contents of the package.
- If the body or clothes come in contact with the contents:
    1) wash off body thoroughly with plenty of water;

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[50] *Id.*

[51] International Civil Aviation Organization, *supra* note 28, at 47.

[52] *Id.*

2) remove contaminated clothes;
3) do not smoke or eat;
4) keep hands away from the nose, eyes and mouth;
5) seek medical assistance.

- The related staff in such incidents should monitor until their names are noted or officially cleared.
- The appropriate authorities must be notified.[53]

2) General Procedures for Cabin Crew

In case the dangerous goods incidents occur in the cabin during the flight, there are special actions required and these are found in ICAO Emergency Response Guide and are as follows:

Initial actions:

- Notify captain.
- Identify the dangerous goods.[54]

In case of fire:

- Use the standard procedures or use water.

In case of leakage or spillage:

- Collect emergency response kit and other necessary items.
- Put on protective gloves and smoke hood or oxygen mask.
- Re-seat the passengers away from the area and distribute wet towels.
- Place dangerous goods items in polyethylene bags.
- Stow polyethylene bags.
- Treat affected seat cushions and covers in the same manner as dangerous goods items.
- Cover spillage on floor or carpet.
- Inspect items regularly stowed away and contaminated furnishings.[55]

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[53] International Civil Aviation Organization, *supra* note 21, at 2-46.

[54] *Id.*

After landing:

- Inform ground personnel of the dangerous goods items and the location of their stowage.
- Make the appropriate entry in the main.[56]

[55] *Id.* at 2-46

[56] *Id.*

CHAPTER 3
INTERNATIONAL REGULATIONS AND FOREIGN LAWS IN THE CARRIAGE OF DANGEROUS GOODS BY AIR

In this chapter, this study will focus on the international regulations concerning the carriage of dangerous goods and laws regarding the same in Australia and New Zealand, since both of these jurisdictions have a significant role in airline industries that it will be mentioned in page 42.

3.1 International Regulations

3.1.1 United Nations Recommendations on the Transport of Dangerous Goods

These recommendations were developed by "United Nations Economic and Social Council Committee of Experts on the Transportation of Dangerous Goods" in 1956. The objective is to be a model regulation to set the standard in the multimodal transport of dangerous goods and to assure the safety of health, environment and properties in the carriage. These recommendations are referred to the International organizations and governments involved in the transport of dangerous goods regulations. These recommendations regulate the standard of the container, label, notification and dangerous goods documentary for the transporter, consignor and inspector in case of the possession or control of the dangerous goods. [57]

Moreover, they also provide convenience and reduce the obstruction in the transportation. These recommendations cover all other transport of dangerous goods excluding the transportation of bulk tankers. These are not compulsory and legally binding on the individual country, however they procure range step of the

[57] United Nation, *"Recommendations on the Transport of Dangerous Goods"*, https://www.unece.org/fileadmin/DAM/trans/danger/publi/unrec/rev17/English/00Erev17_Recommendations.pdf (last visited Jan. 4, 2016).

international acceptance, and also form a foundation for many national laws and international agreements.

These recommendations are amended biennially because they have to supply the growth of the economy, technology and the user demand. So the conference for the amendment is held to improve the regulation in advance.

These regulations have a purpose of presenting a basic plan of conditions which allows the standard development of international and national regulations which govern the various methods of transportation. Moreover, they also remain flexible to supply the special requirement which has been met. It is expected that the international organizations, governments and intergovernmental bodies will comply with the principles in the regulations when developing and revising the regulations for the harmonization in this matter.[58]

The scope of these Regulations ensures the worth of all those who deal in the Transport of Dangerous Goods directly or indirectly. Among various other aspects, these Regulations cover principles of definition, classification, listing of dangerous goods, packing requirement, labeling or placarding, marking, testing procedures or transportation documents. Moreover, they also provide for special requirement related to a particular class of dangerous goods.

According to the classification, packing, listing, marking, labeling, carriers and document in general use, inspecting authorities and consignors have an advantage from streamlined transportation, control, and handling and from a decrease in time-consuming rules. Resultantly, their jobs will be easier or more simplified as impediments to the International transportation of the goods will be reduced. On the other hand, benefits will become more obvious as the commerce in the goods classified as dangerous increases.[59]

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[58] *Id.*

[59] *Id.*

The main points of UN Recommendations on the Transportations of Dangerous Goods are as follows;

A. General Provision, Definitions and Training

General provision was regulated for transport of dangerous goods. It provided the details of safety training, general awareness training, the definition of the words and units of measurement.

In normal circumstances, a person cannot transport the dangerous goods without following the general provision. However, there are exceptions in these 3 cases;[60]

(a) Dangerous goods in bulk which are subject to special regulations;
(b) Dangerous goods which are required for propulsion for factors of transportation and procedure of specialist tool during the transport (such as refrigerator) and are required by the operation regulations (such as a fire extinguisher)
(c) Dangerous goods which are packed for the retail sale which can be carried by individuals for their own use.[61]

These regulations also control the radioactive material transportation by all types on land, air, water and include transport that is contingent to the using of the radioactive material.

Except as provided differently by the regulations, substances prohibited from the transportation are as follows:

Articles and substances which are liable to dangerous reaction, generate flame or dangerous emission of the toxic and dangerous evolution of heat, explosion, flammable gasses or corrosives under the normal conditions generally encountered when transportation.[62]

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[60] United Nation, *supra* note 57.

[61] *Id.*

[62] *Id.*

B. Classification

The term "Dangerous Goods" can be used to explain the goods which are used under the United Nation Recommendations. They can be divided into 9 classes depending upon their hazardous property. (Same as chapter 2 of this thesis)[63]

C. Dangerous Goods list and Limited quantity exception

The dangerous goods list specifies the dangerous goods and is designated by the "UN Number" with name, characteristic, category, subsidiary risk, package group, special provision, IBCs instruction and limited quantities exceptions.[64]

D. Packing and Tanks Provisions

It lists each category of packaging such as ordinary packaging, IBCs packaging, large packaging, etc. for the safety in the carriage.[65]

E. Consignment procedures

This topic specifies the marking and labeling, the clear position of the label, the notice on the cargo to notify the dangerous goods that are contained in the cargo. Moreover, it also states about documentation and special provisions of the dangerous goods.[66]

F. Requirement for the construction and test of packaging, intermediate bulk container, large package and portable tank

It provides the packaging drop test procedure, leak proofness test, internal pressure test and stacking test.[67]

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[63] UN Recommendations on the Transport of Dangerous Goods, *supra* note 10.

[64] United Nation, *supra* note 57

[65] *Id.*

[66] *Id.*

[67] *Id.*

G. Provision concerning transport operations

It can be divided into carriage instruction, which has to ask the permission for carriages such as making, labeling, packing, etc. and special instruction such as a radioactive carriage, tank setting, etc.[68]

3.1.2 IATA Dangerous Goods Regulations

1) Development of IATA Dangerous Goods

The first version was announced in 1956 as "the IATA Restricted Articles Regulations", the manual of industry carrier regulations to be complied with by all the member airlines. The latest edition is 55th edition, effective 1st January – 31st December 2014 published by the IATA Dangerous Goods Boards.[69]

2) Principles of IATA Dangerous Goods

IATA Dangerous Goods Regulations is an easy-to-use manual based on the "International Civil Aviation Organization Technical Instructions for the Safe Transport of Dangerous Goods by Air" which is the basic manual. IATA Dangerous Goods Regulations consists of the necessary information about the airline industry conventions and standards. It consolidates further operations which provide harmonized system for the operators to affirm and transport dangerous goods efficiently and safely in all commercial air transportation. It includes details of individual substances or articles specifying the United Nations classification of each substance or article and their admissibility as well as the conditions for air transport.[70]

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[68] *Id.*

[69] International Air Transport Association, *"IATA Dangerous Goods Regulations"*, http://www.asean.org/storage/images/2015/september/transport-facilitation/batch-3/Dangerous-Goods-Handling-All-modes/Chapter%204-2_ASEAN%20disclaimer.pdf (last visited Mar. 29, 2016).

[70] *Id.*

It also provides strictly, certain procedures and principles for safe transport of dangerous goods. An important element of safe transport of dangerous goods by air is packaging. Most articles or substances categorized as dangerous can be carried safely, provided they are correctly packed and the quantities in the package are properly limited.[71]

These regulations also give guidance on packing that is considered acceptable in transport by air with a scope of option for the outer, inner or single package. UN performance tested specification is used in the packaging instructions, nevertheless, this specification is not required when the dangerous goods are carried in a limited quantity by a provision of "Y" packing instruction.

To minimize the risk that causes the accident, the number of dangerous goods in packaging is exactly limited by these regulations.[72]

3) Identification of Dangerous Goods by Air

Generally, Dangerous Goods when transported by aircrafts can be mainly classified into 4 types as following:

- Forbidden under any circumstances
- Forbidden under normal circumstances but can be carried with special approvals from the States concerned.
- Restricted to carriage on all cargo aircraft (CAO)
- May be carried on passenger aircraft provided certain requirements are met.[73]

4) Packaging as Essential Component of Dangerous Goods Transport

Packing Instructions (PI) are provided with a wide range of options. Normally UN performance-tested specifications are required to be used in packaging except when shipped in limited quantity ("Y Packing Instruction"). The quantity of

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[71] *Id.*

[72] Bugden, Paul M. **"Freight forwarding and goods in transit"**, London : Sweet & Maxwell, (1999).

[73] International Air Transport Association, *supra* note at 69.

dangerous goods accepted in these packaging is strictly limited as to reduce the danger if an accident occurs.[74]

5) Sections in IATA Dangerous Goods Regulations

IATA Dangerous Goods Regulations manual has been structured and designed to be an easy-to-use manual. It contains various sections as following:

Section 1: Applicability

Section 2: Limitations

Section 3: Classification

Section 4: Identification (Blue pages)

Section 5: Packing

Section 6: Packing Specifications and Performance Tests

Section 7: Marking and Labelling

Section 8: Documentation

Section 9: Handling

Section 10: Radioactive Materials[75]

3.1.3 Annex 18 of Chicago Convention – The Safe Transport of Dangerous Goods by Air

The Convention on International Civil Aviation known as the "Chicago Convention", established "the International Civil Aviation Organization (ICAO)", a specialized organization of the United Nations responsible for coordination and regulation of international air travel. This Convention set the regulations of aircraft registration and safety, airspace and information regarding the rights of the signatories dealing with the air travel. The convention also exempts commercial air fuels from taxation.[76]

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[74] *Id.*

[75] *Id.*

[76] Michael Milde, **"Essential air and space law"**, eleven international publishing, (2008).

Technical Instructions and Annex 18 were effective from January 1, 1983 and applicable from January 1, 1984 when all contracting states were anticipated to adapt the ICAO standard and give the legislation approval.[77]

ICAO has divided the standard and recommendation into 18 annexes in the Chicago Convention to support the progress of aircraft safety, minimum standards of safety procedure, training and ensure the same international practices.

The standard and recommended practice of the annex will be applicable to all the international operations of the aircrafts. Annex 18 specifies the safe transport of dangerous goods by air. Further, there is specification for the packing, labeling, and transportation of dangerous cargo.[78]

ICAO is concerned with all the important types of cargo to ensure they are transported safely by adopting "Annex 18 with the Technical Instructions for Safe Transportation of Dangerous Goods by Air". There have been prior laws and regulations on the subject matter but they were not applicable at international level and were difficult to administer or were not consistent with the corresponding regulations of the other transportations.[79]

Annex 18 provides the broad standards and recommended practices for compliance to enable dangerous goods to be carried safely. The Annex contains fairly stable material requiring only infrequent amendment using the normal Annex amendment process.

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[77] *"The International Civil Aviation Organization"*, http://www.encyclopedia.com/doc/1G2-2586700056.html (last visited Mar. 29, 2016).

[78] *Id.*

[79] International Civil Aviation Organization, *"The Convention on International Civil Aviation Annex 1 to 18"*, http://www.icao.int/safety/airnavigation/nationalitymarks/annexes_booklet_en.pdf (last visited Mar. 29, 2016).

The Annex also makes the provisions of the Technical Instructions binding upon contracting states, which contain many details of instructions which are essential for the proper handling of dangerous cargo. These require a constant update as developments occur in the manufacturing, chemical, and packaging industries, and a special procedure has been set by the council to permit the Technical Instructions to be regularly revised and reissued to keep up with the new products and advancements in technology.[80]

The panel meets frequently and also recommends essential editions for the Technical Instructions. The use of the common regulations by the forms of transportation permits cargo to be transferred smoothly and safely in rail, road, air and sea.

Firstly, ICAO requirements for the safe carriage of dangerous goods specify the list of the articles that are risky to be carried in any circumstances and subsequently explain how to transport other dangerous goods safely. [81]

Nine hazardous classes have been defined by the United Nations Committee of Experts and are applicable to all kinds of transportation; they can be divided as follows:

Class 1- all kinds of explosives such as signal flares, sporting ammunition and fireworks.

Class 2 - compressed and liquefied gasses that can be flammable and toxic, for examples refrigerated liquid nitrogen and cylinders of oxygen.

Class 3 - flammable liquids; lacquers, gasoline, paint thinners, etc.

Class 4 - flammable solids or combustible materials and materials that emit flammable gasses when in contact with water such as cellulose type film, some powdered metals and charcoal.

Class 5 - oxidizing material, including chlorates, nitrates; it also covers organic peroxide that is very combustible and oxygen carrier.

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[80] *Id.*

[81] *Id.*

Class 6 - Toxic or poisonous substances such as mercury compound, pesticide, etc., along with infectious substances that are carried for preventive or diagnostic purposes.

Class 7 - radioactive material that is mainly radioactive isotope needed for research or medicine purposes, but is sometimes contained in manufactured articles such as a smoke detector or heart pacemaker.

Class 8 - Corrosive substance that can harm the human tissue and that pose a hazard to the aircraft, for example, battery fluid, caustic soda, paint remover, etc.

Class 9 - miscellaneous category involving materials that are possibly hazardous in the air transport, for example magnetized material that can have an effect on the aircraft navigation system.[82]

3.1.4 Technical Instructions for the Safe Transportation of Dangerous Goods by Air

Technical Instructions for the Safe Transportation of Dangerous Goods by Air are also known as "Technical Instructions or TIs". These instructions in the manual consist of regulations for the safe transport of dangerous goods by air. Furthermore, they also provide necessary details to operators, shippers, organizations or state authority concerned with the air transportation for the safe transport of dangerous goods. These are issued every two years to reflect UN cycle.[83]

The instructions increase the wide provisions of directing the international transportation of dangerous goods by air that are contained in Annex 18 of the Chicago Convention. They consist of necessary details for the safe Transport of Dangerous Goods.

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[82] United Nation, *supra* note 10.

[83] The International Civil Aviation Organization *"Technical Instructions for the Safe Transportation of Dangerous Goods by Air"*, http://www.bazl.admin.ch/experten/regulation/03080/03081/index.html? (last visited Mar. 29, 2016).

Contracting state will frame the detailed provision that is in the instructions by taking essential measures and also making essential standards accomplish agreement with an amendment of the Technical Instructions that may be published during the indicated applicability period of the edition of the instructions.[84]

The Dangerous Goods List of the ICAO Technical Instruction can be divided into twelve columns:

(1) "Name" – consists of an alphabetically arranged list of the dangerous goods which is specified by the correct shipping name in bold character.

(2) "UN Number" – consists of a serial number designated to the substance and article under the UN classifications.

(3) "Class or division" – consists of a division or class; for Class 1 the compatibility group designated to the article.

(4) "Subsidiary risk" – consists of a division and class number of the essential subsidiary risk.

(5) "Labels" – consists of the hazard label which follows the subsidiary risk label to be put on package or overpack.

(6) "State variation" – consists of the reference to entry, which shows the different status from ICAO Technical Instruction.

(7) "Special provisions" – consists of number which refers to an appropriate entry.

(8) "UN packing group" – consists of UN packing group numbers along with a substance or an article.

(9) "Passenger aircraft or Packing instruction" – refers to relevant package instruction list for transport on passenger aircraft.

(10) "Passenger aircraft" – refers to the max amount per package in volume or mass.

(11) "Cargo aircraft or Packing instruction" – consists of the information same as column 9 but for transportation in aircraft cargo only.

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[84] *Id.*

(12) "Cargo aircraft" – refers to the max quantity per package same as Column 10 but for transportation in aircraft cargo only[85]

Furthermore, this manual also provides the specific information for the airlines to limit the carriage of dangerous goods which the airlines have to comply with, for example:

Emirates Airlines

The dangerous goods shall not be permitted as cargo on Emirates Airlines as following:

- "UN 3090 — Lithium batteries or metal cells, including lithium alloy cells and batteries, prepared in accordance with Section IA, IB or II of Packing Instruction 968. This prohibition includes lithium metal batteries carried in accordance with Special Provisions A88, A99 and A201".[86]

- "UN 3480 — Lithium ion cells and batteries, including lithium polymer cells and batteries, prepared in accordance with Section IA, IB or II of Packing Instruction 965. This prohibition includes lithium ion batteries shipped in accordance with Special Provisions A88 and A201".[87]

Jetstar

- "UN 3480 — Lithium ion batteries (including lithium polymer batteries) carried as AOG spares. The words A.O.G Spares must be entered into the additional handling information box on the air waybill or the shipper's declaration when no

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[85] Government of Canada, *"Regulatory Overview"*, https://www.tc.gc.ca/eng/civilaviation/standards/commerce-dangerousgoods-regoverview-menu-298.htm (last visited May. 17, 2016).

[86] Technical Instructions For The Safe Transport of Dangerous Goods By Air 2015-2016 Edition Addendum No.2/Corrigendum No. 2

[87] *Id.*

shipper's declaration is required in the handling information or nature and quantity of goods box".[88]

- "UN 3480 — Lithium ion batteries (including lithium polymer batteries) when shipped for use in urgent life-saving devices (where no other means of transport is available). The words urgently required to Support Life-Saving Devices must be entered in the additional handling information box on the air waybill or the shipper's declaration when no shipper's declaration is required in the handling information or nature and quantity of goods box".

The above-exempted shipment must:
- not exceed 100 kg net each;
-comply with all relevant parts of the IATA Dangerous Goods Regulations;
- not be more than 100 kg total weight per aircraft; and
- be loaded into a Class C cargo compartment.[89]

3.1.5 International Health Regulations

The International Health Regulations or "IHR" entered into force on 15 June 2007, is the global health security agreement between 196 countries which are the member of World Health Organization and Thailand is one of party to this regulation. The objective is to prevent the international community and public health from a hazard that can cross border and threaten people worldwide. It can restrict intervention with international trade and traffic and ensure public health through the prevention of spread of disease.[90]

A disease can spread quickly and widely through the travel and international trade. A health crisis in one country can affect the other parts of the world. It can happen from disease such as the spread of influenza pandemic or

[88] *Id.*

[89] *Id.*

[90] World Health Organization, *"About IHR"*, http://www.who.int/ihr/about/en/ (last visited May. 17, 2016).

Ebola virus disease. Furthermore, IHR can control other public health emergency cases such as the spillage or leakage of the chemicals.[91]

They require the countries to care for public health and correctly respond to finding out, report and control public health in case the incident or accident occurs. The way to help the world become more secure, they should have the detection and reporting of public health incident.[92]

The stated objective and scope of the IHR are "to prevent, protect against, control and provide a public health response to the international spread of disease in ways that are equivalent with and limited to public health risks, and which keep away from needless interference with international traffic and trade". Because IHR is not restricted to particular diseases, but are appropriate to health risks, regardless of their source or origin, they will follow the development of disease and the factors influencing their transmission and emergency. [93]

The IHR require the states to strengthen response abilities and essential care at the primary, intermediate and national level, as well as at selected international airports and ground crossings. They additionally present the series of health documents, consisting of an international certificate and the ship sanitation certificates of prophylaxis or vaccination for the travelers.[94]

It is related to air transportation and public health because this regulation can prevent and control the spread of epidemic which affect to the international traffic and trade.

1) Air Transport Organizations

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[91] *Id.*

[92] *Id.*

[93] World Health Organization, *"International Health Regulations (2005)"*, http://www.who.int/ihr/9789241596664/en/ (last visited May. 17, 2016).

[94] *Id.*

International Civil Aviation Organization (ICAO) is a specialized UN Organization responsible for supporting the development and planning of the international air transportation. ICAO has particular standards related to IHR requirements and public health. Instructions for states concern about the management of a communicable disease posing a serious public health risk.[95]

Cooperative preparation for prevention of diseases through Air Travel–CAPSCA, associated with public health emergency plans at the airport, together with WHO and the other international bodies.

International Air Transport Association conducts, represent, and supports the airline industry. It has developed functional procedures and training together with ICAO and WHO.[96]

2) Cooperation in Public Health

IHR (2005) Annex 9 and Convention of International Civil Aviation
Annex 9 -Facilitation Health part of aircraft general declaration

Fever (38°C/100°F or over) plus one or more of the following Symptoms:

- Appearing obviously unwell
- Persistent coughing
- Impaired breathing
- Persistent diarrhea
- Persistent vomiting
- Skin rash
- Bruising or bleeding without previous injury
- Confusion of recent onset[97]

[95] World Health Organization, *supra* note 93.

[96] *Id.*

[97] *Id.*

Pilot-in-command to notify ATC as soon as he is aware of a suspected case of communicable disease onboard (IHR Art 28 and Convention of International Civil Aviation Annex 9 – Facilitation 8.15)

Public Health Passenger Locator Card (Convention of International Civil Aviation Annex 9 – Facilitation, Appendix 13 and WHO Case Management of Influenza A(H1N1) in Air Transport) [98]

3.2 Foreign Laws

3.2.1 Australia

The reason why this writer chooses Australia standard to be the model of study because the airlines in Australia have proper safety standards and meet the requirement of ICAO. They also have the proper management and the aviation regulations. The evidence that supports this idea is that Australia's Qantas is the world's safest airlines of 2016 ranking from the world's plane safety and product rating website. It got this prize continuously for 3 years. It has never had any fatal accident or incident in the aircraft era.

The Australian airline is the leader in the development of airline system, flight data record, crew performance, time monitoring and safety and security system that can detect the problem from a major safety issue.[99]

The world's second safest airline belongs to "Air New Zealand", the national airline of New Zealand, it offers the greatest peace of mind when flying. According to the safety aviation network, the results of the accidents are well below the 10-year average and it has not suffered from any significant incidents.[100]

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[98] *Id.*

[99] The Telegraph, *"The world's safest and least safe airlines revealed",* http://www.telegraph.co.uk/travel/news/The-worlds-safest-airlines-revealed/ (last visited Jun. 30, 2016).

[100] NZ Herald, *"Air NZ world's second safest airline",*

Airlines ratings released the annual airline safety ranking which uses the star rating system. The maximum rating an airline can get for safety is seven stars. The star rating is assessed from many factors such as aviation governing, airline fatality record, government audit, operational history and accident record.

For the safety rating criteria, the airline has to be certified by the IATA Operational Safety Audit. It is designed to evaluate in standard and consistent manner every two years. Moreover, the airlines have not been in the European Union Blacklist and the country of airlines conform with the ICAO's eight-point safety parameters which are Licensing, Legislation, Operations, Organization, Accident Investigation, Aerodromes, Airworthiness and Air Navigation Service.[101]

The list of the world's safest airlines ranking is as following:

1) Qantas
2) Air New Zealand
3) Alaska Airlines
4) All Nippon Airlines
5) American Airlines
6) Cathay Pacific Airways
7) Emirates
8) Etihad Airways
9) EVA Air
10) Finnair [102]

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http://www.nzherald.co.nz/nz/news/article.cfm?c_id=1&objectid=11183011 (last visited Jun. 30, 2016).

[101] International Civil Aviation Organization *"Safety Audit Information",* http://www.icao.int/safety/Pages/USOAP-Results.aspx (last visited Jun. 30, 2016).

[102] Christine Forbes Smith, *"Who are the world's safest airlines for 2016?"*, http://www.airlineratings.com/news/630/who-are-the-worlds-safest-airlines-for-2016 (last visited Jun. 30, 2016).

Australia is one of the members of the International Civil Aviation Organization and signatories of the Chicago Convention. It has applied the provisions that are detailed in the Technical Instructions to its regulations to reach a higher safety standard.

There are many regulations that provide the carriage of goods by air. In the carriage of dangerous goods by air, there are "Australian Civil Aviation Act 1988" and "Civil Aviation Safety Regulations 1998" which are regulated by the Civil Aviation Safety Authority (CASA). They enact the regulations for the carriage of dangerous goods, consignment, the training of aircraft personnel and the shipper of dangerous goods. They also enact the regulations for the cargo shipper to declare the goods which are not dangerous and a description of the contents.[103]

The Civil Aviation Safety Regulations 1998 are applied on all Australian aircrafts and all foreign aircrafts that operate in Australia.

3.2.1.1 Classification of Dangerous Goods

The articles that seem to be dangerous goods are classified in the Technical Instructions list. The TI list also specifies the UN classification number, packing instruction and the limit of dangerous goods quantity per package. However, the listing cannot cover all types so there are many generic article entries.

Technical Instructions also have detail about the examination of particular items to determine if they are dangerous and classify the dangerous goods into the proper generic group. If there is some in doubt, rechecking should be done with the distributor or manufacturer of the goods.[104]

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[103] Australian Government Civil Aviation Safety Authority, *"Dangerous Goods-Risk Reduction Strategy"*, https://www.casa.gov.au/standard-page/dangerous-goods-risk-reduction-strategy (last visited May. 17, 2016).

[104] *Id.*

Some dangerous goods cannot be carried on the aircraft because they are too dangerous. Some of them are prohibited under any conditions but can be carried if they get the permission from the aviation authority of the country. Some dangerous goods are strictly carried on only the cargo aircraft. However, if the requirements are complied with, most of them can be carried by the passenger aircraft.[105]

3.2.1.2 Packing of Dangerous Goods

One of the important parts of the safe carriage of dangerous goods by air is the packaging. The regulations provide an instruction for dangerous goods packaging that is acceptable for carriage. The packaging instruction consists of the "UN performance-tested specification packaging" but it is not required in case the dangerous goods are carried in small amount under the "Y" packing instruction. A reason to limit the dangerous goods is to reduce the risk that can cause an accident.

In Australia, there are many package suppliers that provide the UN specification packaging. The general rule requires the test for the dangerous goods and packaging to be proper and safe during carriage. However, there are some exceptions and if there are doubts about packaging standards, it is better to consult with CASA.[106]

Moreover, there is a special organization, National Association of Testing Authorities, that can test if the packaging complies with UN standards.

3.2.1.3 Documentation of Cargo

The cargo consignors have the duty to describe or declare the contents of cargo that may contain dangerous goods. A person who handles the cargo at the airline should know the nature of the cargo, identify the position and remove some items that can cause danger during the carriage.

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[105] *Id.*

[106] *Id.*

To declare the dangerous goods, a shipper declaration form has to be completed. The objective of the declaration of dangerous goods is to let the personnel involved in the carriage know the type of dangerous goods that they are carrying, how to handle, load them and prepare correctly in case an accident or incident occurs onboard or on the ground.[107]

Furthermore, a Notification to Captain (NOTOC) form has to be completed by the airline to ensure that the captain is aware of the dangerous goods, knows the location and the emergency response actions in case any emergency occurs.

3.2.1.4 Information to Consignors of Cargo and Passengers

The information concerning "hidden dangerous goods" should be provided to the passengers to help them recognize whether there are some dangerous goods that cannot be permitted to carry on board and check in baggage. The information has to be provided to the person who consigns cargo as well.

Normally, this information is presented on the boarding pass, the banner and signs at the check-in counter and the baggage hall. Traveler agencies also have to provide this information when they sell the ticket or web-based agencies when using an e-ticket.[108]

3.2.1.5 Labeling and Marking

According to the regulations, the consignments which contain dangerous goods have to be correctly labeled and marked. It includes UN number, hazard labels and the shipping name. The person who deals with handling the consignments must know the nature of risk and precautions in the event there is breakage or leakage.[109]

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[107] Australian Government Civil Aviation Safety Authority, *supra* note 103.

[108] *Id.*

[109] AC 92.A-01(0) The Consignment and Carriage of Dangerous Goods on all aircraft in Australia territory and on Australia aircraft overseas: An overview of the legislative framework and procedure, March 2011

3.2.1.6 Training

The training is an important part to make the carriage of dangerous goods safe. The shipper should be trained about the class and package appropriately. The airline operator should be trained to accept and examine the cargo, identify undeclared dangerous goods and ensure that the packaging, documentation and handling comply with the correct instructions.

According to the Civil Aviation Safety Regulations, the employees have been divided into six groups, by concernig with the duty and responsibility of the employees. The employees who are required for training are ground handling agents, aircraft operators, security screening agencies, shippers and freight forwarders.[110]

3.2.1.7 Incident and Accident investigation

The aircraft operators have to report dangerous goods accidents or incidents to a related safety authority. To prevent the re-occurrence, an investigation to establish the cause is required.

From a study, it has been observed that the accident does not occur from declared dangerous goods or the result of spillages. Most of the problems are caused by the undeclared dangerous goods.[111]

3.2.1.8 Operations and Dangerous Goods that are excluded from the ICAO Technical Instructions

These actions are not especially contained in the Technical Instructions and consequently not subject to dangerous goods regulation except particular reference. They are suitable for both international and domestic airline operators. In other words, these actions related to operations with dangerous goods are allowed by the Act and

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[110] *Id.*

[111] Australian Government Civil Aviation Safety Authority, *supra* note 103.

the Regulations, and for these actions the TIs are considered as not applicable to dangerous goods carried for the objectives as following:

- to give first aid to an in-flight patient;
- to give humane killer or veterinary aid for an animal during flight;
- to drop in connection with horticultural, agricultural, control activities, pollution or forestry;
- the principle dealing with rescue and search operation.[112]

A trained personnel controls the dangerous goods all the time when they are carried on the aircraft during takeoff and landing.

The airline operator has to establish the instructions and process which are subject to the requirement of the dangerous goods manual and dangerous goods incident report.[113]

3.2.1.9 Dangerous Goods that may be Carried by Passengers

Baggage is one of the parts of "cargo" where there are less strict requirements if the baggage is carried on the same aircraft as the passengers.

A safety concept which concerns the carriage of dangerous goods is that it must happen fundamentally as labeled, marked, suitably packaged and declared cargo. Nevertheless, principles have been made for certain dangerous goods that are carried by the crew or passengers on board an aircraft. The list of such articles continues to develop with the functional experiences.[114]

This concept allows passengers to carry personal items, toiletry and some household items. This principle also includes a certain type of dangerous goods that

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[112] *Id.*

[113] *Id.*

[114] AC 92.A-01(0) The Consignment and Carriage of Dangerous Goods on all aircraft in Australia territory and on Australia aircraft overseas: An overview of the legislative framework and procedure, March 2011

are regularly required by holidaymakers and business travelers, while providing the safety of the passengers.

The standard of dangerous goods classification is the same, such as an aerosol of deodorant has the same class standard as dangerous goods, but the passengers can carry this item on board in a limited quantity. In case the aerosol is carried as cargo, stricter conditions must be adopted.[115]

Some of the dangerous goods items which are carried by passengers still require the permission of the airline operator to ensure safety. To ensure that the airline is informed about the dangerous goods and can establish essential standards to handle appropriately, it is necessary to have the operator approval.

The lists of dangerous goods that the passengers are allowed to carry are announced on the airline operator's websites. They also provide the information at the check-in counters. However, the passengers can contact airlines which they fly with as any decision to carry dangerous goods is at the prudence of the involved airlines.

In the case of the goods not being in the dangerous goods list or if the Technical Instruction declares that the items are "not restricted", then such items are not dangerous goods and passengers can carry them in check-in or carry-on baggage.[116]

In the case of Mishandled Baggage, the normal conditions of dangerous goods that are carried by the passengers can be applied and it is unnecessary to remove the regularly allowed toiletries and personal items from their baggage.

Some of the cargo agencies provide a service by which a passenger's baggage may be delivered or collected ahead of the flight. In this event, the baggage is carried as a cargo; the baggage is not planned to be carried with the passenger. Thus, any

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[115] *Id.*

[116] *Id.*

dangerous goods may not be contained in the unaccompanied baggage. It is subject to the principles which deal with declaring that the content is not dangerous.[117]

A number of items in the Technical Instructions are marked up in such manner that if they are packed in a particular pattern, then "No other provisions" of the Technical Instructions are applied. The result is a lot of differing opinions as to whether the passengers carry these articles. The method applied in Australia is to determine the risk posed by the dangerous goods, when packaged or prepared, but carried by the passenger's baggage. The operators are authorized to enforce more limit requirement.

Therefore, it is normal practice that the passengers intending to carry certain dangerous goods that are prepared in the way they are "not subject to other conditions of the Technical Instructions", still require the airline operator's approval. When sought in advance, the approval is obtainable and structured around being able to make advance notification preparation for aircraft crew and handling staff.[118]

3.2.1.10 Penalties

The Australian regulation was adopted with the principles of ICAO Technical Instructions for the Safe Transport of Dangerous Goods by Air, one of them is the penalty. It is necessary to have the measure to control the carriage of dangerous goods system and to punish a person who fails to comply with the dangerous goods regulation so the penalty is required.

"According to the Civil Aviation Act (1988) and applicable regulations, including Part 92 of the Civil Aviation Safety Regulations (1998), a person cannot carry or consign for carriage the dangerous goods on board the aircraft unless complying with these regulations. If a person fails to comply with this dangerous goods regulation, it will result in financial penalties or up to seven years imprisonment, such as in 2008 a warehouse supervisor was convicted of consigning

[117] Australian Government Civil Aviation Safety Authority, *supra* note 103.

[118] *Id.*

dangerous goods contrary to section 23(2) of the Civil Aviation Act (1988). He pleaded guilty and was sentenced imprisonment for nine months, which was substituted for a fine of AUD$ 5,000 in the appeal court".[119]

3.2.2 New Zealand

New Zealand Civil Aviation Authority enacted this rule under the "Civil Aviation Act 1990" to set the standard for air transportation in New Zealand. It was applied by the Technical Instructions for the Safe Transport of Dangerous Goods. It also has exceptions for the transportation in New Zealand.

There are two objectives of this regulation as following:

1. To package dangerous goods correctly to protect the hazards or minimize the risk that can happen when they are carried.

2. To communicate the presence of the dangerous goods. The labeling, marking and documentation can tell the personnel to correctly handle the normal conditions or if ever a leak or incident occurred.

3.2.2.1 Classification of Dangerous Goods

By studying the rules Part 92, the classification and hazard communication requirements of the Technical Instructions are used by the operators to prepare their air transportation.

The dangerous goods are classified into hazard classes; they identify the risk that may pose in transportation. In the IATA Dangerous Goods Regulations, they are found in "Section 3, Classification for all non-radioactive materials", and for "Class 7,

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[119] Kristin Hibbard, *"Transporting dangerous goods may be more costlier than you think"*, http://www.hwlebsworth.com.au/latest-news-a-publications/publications/transport/aviation/item/873-unsafe-transport-dangerous-goods.html (last visited May. 17, 2016).

Section 10, Radioactive Material". This information corresponds to "Part 2 in the ICAO Technical Instructions".[120]

There are specific criteria for each hazard class which are used to decide if a substance belongs in that class. For example, "the flashpoint - the lowest temperature at which a liquid gives off flammable vapors – is used to establish whether liquids are flammable enough to be placed in Class 3".

An operator has a duty to determine the dangerous goods and its class. The classification is essential to provide the process for handling the substance in that class. It is especially the case for a new mixture of the chemical when it is carried.[121]

For these reasons, the operators have to know the characteristics and technicalities of the materials they are carrying. They have to review the classification and the regulations to control it with the necessary technical data.

3.2.2.2 Packing Group

The packing group can be divided into 3 classes depending upon its danger level as follow;

1) Packing Group I - Great Danger
2) Packing Group II - Medium Danger
3) Packing Group III - Minor Danger[122]

The substances in the hazard classes are classified by the level of their risk. The key to examining the proper packaging for the substance is "Packing Group".

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[120] Civil Aviation Authority of New Zealand, **"The Offering Of Dangerous Goods For Carriage By Air"**, (2010)

[121] *Id.*

[122] Civil Aviation Authority of New Zealand, "*Dangerous Goods Booklet*", https://www.caa.govt.nz/Dangerous_Goods/DG_Booklet.PDF (last visited May. 17, 2016).

The substances in packing group I must be more strictly tested than packing groups II and III because they are the most dangerous while the substances in packing groups II and III have less danger accordingly.

The classification part also explains about the determination of the Packing Group. To decide the limited quantity of a substance that is accepted to be carried in a package, the operators have to understand the packing group of a particular product.[123]

3.2.2.3 Documentation of cargo

Dangerous Goods Transport Document is specified by IATA Dangerous Goods Regulations; it is required to use this form in the carriage of dangerous goods by cargo. It is different from the air waybill that is used in the carriage of goods by cargo.

"This document gives the following full details of the shipment:

- Name/Address of consignee and shipper
- Aircraft type
- Airports of origin and destination
- Shipment type
- Proper shipping and technical name
- Hazard class
- UN/ID number
- Subsidiary risk
- Type and quantity of package
- Packing Instruction
- Any special authorization
- Additional handling information
- Shipper's certification"[124]

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[123] *Id.*

[124] Civil Aviation Authority of New Zealand, *supra* note 120.

3.2.2.4 Labeling and Marking

In the case of a specification package, it must be marked that the specification testing is required. “Section 7 of the IATA Dangerous Goods Regulations and Part 6, Chapter 2 in ICAO” provides the details of marking requirements.[125]

If the operators are responsible for using the specification marking on the package, they must ensure that the packages have met the requirements such as the chemical compatibility and performance testing. The testing is very essential. It is important to carefully keep the record, because the Civil Aviation Authority will check all evidence of package testing when they conduct an inspection of investigating incidents or operated facilities.[126]

The package has to be marked and labeled with the proper hazard symbol. The hazard labels for the shipping name and UN number which show on the package with the label are identified in the “IATA Dangerous Goods List”.

Generally, proper shipping name and additional technical name for the hazardous constituents are required to be shown on the package and accompanying documentation. When appropriate, handling labels such as the “CARGO AIRCRAFT ONLY and the orientation arrows must be applied”.[127]

3.2.2.5 Training

According to the “Civil Aviation Rule Part 92 Carriage of Dangerous Goods”, the following groups must complete an appropriate dangerous goods training, and it must be repeated every two years:

- Operator who accepts the carriage of dangerous goods by air;
- Regular shippers of dangerous goods and their agents;
- Handling agent who accepts the carriage dangerous goods by air;

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[125] Civil Aviation Authority of New Zealand, *supra* note 122.

[126] *Id.*

[127] *Id.*

- Organization and personnel, other than operator, who are involved in the carriage by air, either cargo or passengers;

- Security agency that screens the passengers and their baggage.[128]

3.2.2.6 Penalties

In the carriage of dangerous goods, it is necessary to remember that though the regulations are frustrating, they exist for some reasons. Airline operators had bad experiences when the dangerous goods were not properly handled, as the people could be injured and killed.

For this reason, New Zealand regulations have specified "a minimum $250 penalty and maximum $12,000 penalty per violation, and there are principles for criminal prosecution allowing fines as high as $30,000 when violations have been willfully committed".[129]

[128] Civil Aviation Authority of New Zealand, *supra* note 122.

[129] *Id.*

CHAPTER 4
THE CARRIAGE OF DANGEROUS GOODS BY AIR REGULATION IN THAILAND

In this chapter, this writer will focus on the carriage of dangerous goods by air in Thailand. This chapter will start on the Thai regulations that are related to the carriage of dangerous goods, analyze the legal problems and suggest resolution for these matters. Lastly, this writer will provide Remedial Measures in Practice.

4.1 The Carriage of Dangerous Goods by Air in Thai Law

4.1.1 Hazardous Substance Act B.E. 2535

The reason to proclaim this act is that "at present a great number of hazardous substances have been used in various businesses and some of them have caused serious injuries to life, health, property and environment. Although there exist some laws which are applicable to the hazardous substances, there are so many of them which are under the power of several ministries, bureaus and departments as a result of different proclamations made in different periods of time entailing discrepancies and incomprehensiveness of their provisions".[130]

At first, this act provides the definition of the related words and the power of responsible Ministers and it includes any of the following substances:

According to Section 4 of the Hazardous Substance Act, hazardous substances include:

1. Explosive
2. Flammable substance
3. Oxidizing agents and peroxide
4. Toxic substance
5. Infectious substance

[130] Hazardous Substance Act B.E. 2535

6. Radioactive substance
7. Mutant causing substance
8. Corrosive substance
9. Irritating substance
10. Other substance either chemical or otherwise which may cause injury to human, animal, plant, property or environment.[131]

Because of the various characteristics and uses of the hazardous substances, the Hazardous Substance Act cannot be enforced by one organization. The ministries that are involved in controlling the hazardous substances are the Ministry of Agriculture, the Ministry of Industry and Cooperatives, and the Ministry of Public Health. In addition, other organizations for example the Ministry of Interior, the Ministry of Science and Technology and the Ministry of Defense are also involved in the enforcement of this Act.[132]

The Minister of Industry has the authority to:

1) Promulgate the regulation

- prescribe the charge at a rate not exceeding as provided under annex of the Act;

- specify the exceptions of fee payment;

- specify procedures and standard for acceptation, application and renew the permit to manufacture, importation, exportation and transfer of toxic substance.

2) Make Notification in the Government Gazette following the recommendation of the Committee:

- Design name, use or type of hazardous substance, responsible agencies and time of application;

- List hazardous substance type II and type III that is exempted from the registration.[133]

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[131] Hazardous Substance Act B.E. 2535, *supra* note 8.

[132] Hazardous Substance Act B.E. 2535, Section 5

[133] *Id.*

This act is divided into 4 chapters and it can be concluded as following:

(1) Chapter 1 specifies about the hazardous substances committee's authority to regulate the rule, qualification of member, power and duty of the committee, give the suggestion to control and protect the damage from the hazardous substance.

(2) Chapter 2 specifies about hazardous substance control. This chapter directly deals with the transportation of hazardous substance such as the importation and exportation, the registration, the permission, the method and condition to govern the hazardous substance which is classified into 4 types depending upon the level of hazard as follows:

Type 1 - Hazardous Substance; consist of those which pose a low level of hazard and therefore require less control. A production, possession, importation or exportation of this category of substances does not require a registration certificate and license; however, the operators have to conform to the specified standard and procedure.

Type 2 - Hazardous Substance; consist of those which require controlling and monitoring. A production, possession, importation or exportation of this category of substances must be notified to the authority. The operators have to conform to the specified standard and must receive a registration certificate.

Type 3 - Hazardous Substance; consist of those which require strict control procedure due to the high degree of hazard, as compared with Type 2 hazardous substance. A production, possession, importation or exportation of this category of substances requires permission and a registration certificate.

Type 4 - Hazardous Substance; consists of those which are considered to pose an injury to a human. A production, possession, importation or exportation of this category of substance is forbidden.[134]

[134] Hazardous Substance Act B.E. 2535, Section 18

The responsible Minister, after recommendation by the committee, has the power to determine following matters by announcing in the Government Gazette as follows:

1) Appointment of the competent official.

2) Specification of qualifications, composition, containers, methods of testing and examining container, production, label, sale, export, import, transport, disposal, stowage, treatment, prevention, submitting the specimens, information or the matter related to hazardous substance in control, reduction or constraint of danger to be imposed upon human, plant, animal, environment or the property, taking into consideration international covenants or conventions.

3) Designate the expert, specialist or personnel who is liable for the execution of power

4) To set up the acceptable quantity of the hazardous substance.

5) Designate the name and qualification of hazardous substance exempted from registration.

6) Establish the standard of the registration of hazardous substance.[135]

However, not all of such substances shall be controlled under the Hazardous Substance Act. This is because section 18 paragraph 2 of this act provides that "For the purpose of prevention and stopping danger that may be inflicted upon the persons, animals, plant, property or environment, the Minister of Industry with the recommendations of the Committee, shall have the power to publish in the Government Gazette, the names or qualifications of hazardous substance, types of hazardous substance, period of application and responsible agencies for the control of the said hazardous substance."

Consequently, this act controls only those substances which the Minister of Industry has published in the Government Gazette. Other substances which are not listed in the Ministry of Industry Announcement are not controlled under this act.

[135] Hazardous Substance Act B.E. 2535, Section 20

Moreover, Chapter 2 also gives the details about the authorities the competent official that mentioned in Section 54 as follows:

1) Arresting a suspected person to investigate if there is a suspicious reason to trust that the offense was committed.

2) Inspecting the engaged substance relating to the stowage and production of a hazardous substance and examine the vehicles which are suspected of carrying a hazardous substance.

3) Taking a quantity of a suspicious or hazardous substance for an additional test.

4) Searching, detaining, and seizing hazardous substance, books of account, containers, or document of the related articles if there is a reasonable ground to suspect that the offense was committed.

5) Summoning in literature to submit or to test the document on substance in deliberation.[136]

(3) Chapter 3 specifies about duties and civil liabilities. While determining the liabilities and duties, the Minister of Industry has the power to announce in the Government Gazette, any object to be considered as a hazardous substance.

(4) Chapter 4 specifies about penalties that there are principles for criminal prosecution allowing both a fine or up to seven years imprisonment. In case that the punishment is only fine or imprisonment not over than one year, the committee has the power to settle them.[137]

T he Hazardous Substance Act is the essential law and substantially affects the safety of people and environment. In addition, this act is connected with several ministries so it should have acooperation in an amendment to make this act more effective.

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[136] Hazardous Substance Act B.E. 2535, Section 54

[137] Hazardous Substance Act B.E. 2535, Section 89

4.1.2 International Air Carriage Act B.E. 2558

The International Air Carriage Act has been promulgated in Thailand recently. This act applies together with the Montreal Convention 1999 that covers the liability for delays of carriers, accidents or cargo losses. However, this Act does not apply to the postal carriage. Prior to the declaration of the law, all matter in claims against air carriers were brought by the tort principles in the Civil and Commercial code.[138]

The reasons to promulgate this Act were that prior to the enactment of this law, international air carriage was covered under the Civil and Commercial code, which was unable to cover the special characteristics of the international air carriage appropriately. Therefore, a new act had to be enacted to stipulate some regulations about the international air carriage for the harmonization of the international regulations and also apply them to this act.

However, in the carriage of dangerous goods by air, the article that states about the carriage of cargo is under Chapter 2 article 24-45 of this act but it does not cover the carriage of dangerous goods.

4.1.3 Air Navigation Act B.E. 2497

A reason for the proclamation of this act is due to rapid growth of aviation in this world, particularly in a technical aspect, since the aircrafts that fly in the country have unprecedented complications and have larger and higher speed more than the past, so it is necessary to enact stricter control in the air traffic and navigation operation.

Thus, it was essential to enact the air navigation law, including the principle to establish the Civil Aviation Board that provides the authorities to enact the regulations following the Act and Annex to the Convention on International Civil Aviation held

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[138] Robert Virasin, *"Summary of the International Air Carriage Act 2015"*, http://www.siam-legal.com/thailand-law/summary-of-the-international-air-carriage-act-2015/ (last visited Jan. 4, 2016).

at Chicago on the 7th of December B.E. 2487 that Thailand became a party to, and set 5th provisions on the establishment of air navigation facility, in accident and the qualification of the officer.[139]

In this act, there are some sections that state about dangerous goods as follows:

"Section 25 - No person shall send by, or carry in, any aircraft with munitions of war according to the law on the control of munitions of war unless with the permission in writing of the Minister, and in accordance with the conditions determined by the Minister."[140]

"Section 26 - No person shall send or carry on board an Aircraft dangerous goods or animals which may endanger the safety of the Aircraft or persons on board the Aircraft as specified in the Ministerial Regulations unless written permission has been obtained from the Competent Official and the conditions specified by the Competent Official are complied with."[141]

There are only two sections that stated about dangerous goods. They are inadequate and do not cover all the matter of the international carriage by air. Therefore, some sections of the act should be amended for the current situation.

4.1.4 The Department of Civil Aviation Regulation No.92

This regulation has been promulgated in June, 2015 under the Air Navigation Act B.E. 2497. This regulation was adopted from Annex 18 Chicago Convention and the Technical Instructions by the Department of Civil Aviation. It has been divided into 2 chapters, 26 articles and it specifies about the governing of dangerous goods in chapter 1, article 3-17 which have the main points as follows:

It prohibits the carriage of dangerous goods by air unless;

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[139] Government Gazette, Vol. 71, Part 58, page 1249, 14 September B.E. 2497.

[140] Air Navigation Act B.E. 2497, Section 25

[141] Air Navigation Act B.E. 2497, Section 26

(1) The sender is allowed to pass goods and the operator is allowed to carry with the aircraft under the Air Navigation law or other relevant legislation and also the law of the origin and the destination country.

(2) The sender can assure that the goods are not prohibited Dangerous Goods for carriage by specifying classification, packing, labeling and marking and signing a carriage of dangerous goods Document as stipulated with technical specification.

(3) The internal audit in Transport of Dangerous Goods by Air and checklist form is provided to Director for approval.

(4) The transport of dangerous goods documents has to be checked and completed unless they are excluded in technical specifications.

(5) The packaging and containers of Dangerous Goods have to be checked and abided as per the acceptance procedure that is listed in the technical regulations.

(6) The operation of trucks, loading and stowage are done as stipulated in the technical regulations.

(7) A dangerous goods acceptance checklist has been developed and used as a tool for compliance in (2) and (4).

(8) The dangerous goods have been audited by security plan according to the regulations from the Board of Civil Aviation and air mail.

(9) The dangerous goods are in the control of postal and have the process and training as stipulated in the technical regulations.

(10) The safety management systems are provided following the regulations of the Civil Aviation.[142]

The packages which contain dangerous goods under Article 3 (2) must have the relevant label following the conditions as stipulated in the technical regulations.

To comply with the requirements in technical regulations, Packaging shall be identified by name in English. Each package must be produced for use in special

[142] The Department of Civil Aviation Regulation No.92, Article 3

packaging with all the relevant details. If there is no marker, at least it needs to have the details about the conditions on the packaging.[143]

The aircraft operator is prohibited to transport the Dangerous Goods on board unless technical regulations are accepted.[144]

The aircraft operator must provide the loading and stowage of dangerous goods and the freight containers which contain the radioactive material as defined in technical regulations.[145]

The air operator has to remove contamination caused by the leaking package or damage on the aircraft to a safe place rapidly and ensure that the products left on the aircraft can be transported safety, not harm the aircraft or passengers. In the case of radioactive contamination, the air operator must not use the aircraft in service until the radiation is at a safe level as stipulated in the technical regulations.[146]

The aircraft operator must provide the label "Cargo Aircraft Only" to packages having dangerous goods as defined in technical regulations.[147]

In the case of an emergency during the flight, the pilot has to inform the air traffic controller and the airport as soon as possible that Dangerous Goods are carried on board as stipulated in technical regulations.[148]

4.2 Legal Problem Analysis of the Carriage of Dangerous Goods by Air in Thailand

After having analyzed the related laws in this matter, the author finds that there are some shortcomings in Thai law as follows:

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[143] The Department of Civil Aviation Regulation No.92, Article 5

[144] The Department of Civil Aviation Regulation No.92, Article 9

[145] The Department of Civil Aviation Regulation No.92, Article 10

[146] The Department of Civil Aviation Regulation No.92, Article 12

[147] The Department of Civil Aviation Regulation No.92, Article 15

[148] The Department of Civil Aviation Regulation No.92, Article 16

4.2.1 Insufficient Details of the Act

Hazardous Substances Act B.E. 2535 is the Act that deals with the production, importation, exportation and possession of dangerous goods, but it does not cover in details the carriage of such dangerous goods. This act regulates only the general principle, for example, the label in the carriage has to clearly present the state of dangerous goods or the container, equipment etc. in the carrier have to be carefully inspected during the transportation.

Following the above example, the Act does not specify in details how the correct transportation and equipment should be. Although, this Act is applicable to all kinds of transportation, it is not suitable in practice and the ministry does not have competency because each kind of transportation is different in detail, technicality and procedure so it is difficult to enforce all kinds of transportations using the same standard.

In the case of the Air Navigation Act B.E.2497, it was enacted since B.E. 2497 and the substances of this act do not cover all the matter of the international carriage by air. There are only a few provisions stating about dangerous goods and they are not enough for the current situation. Therefore, some sections of the act should be amended such as the carriage of dangerous goods, penalties to be suitable in practice etc.

For the Department of Civil Aviation Regulation No.92, although it is applicable to some parts of Technical Instruction such as Chapter 8 Operator's Responsibilities, it still lacks some details such as limitation on the transport of dangerous goods by air, shipper's responsibilities, dangerous goods transportation documents, compliance and inspection systems etc., because it was enacted urgently to solve the encountering problem. It also does not clarify some sections such as packing, labeling and marking that should specify more details in these matters.

Moreover, there is no provision which states about the penalties in this regulation. So in effect the problem persists regarding the responsibility and penalties for the persons who do not comply with the regulation.

4.2.2. Implementation Problems

Because the dangerous goods accidents can severely affect humans, properties and environments, it is imperative to have clear regulations to control the carriage of dangerous goods procedure to prevent the damages that can happen, and solve the problem in this matter.

All the regulations and the measures to control the carriage of dangerous goods are the subordinate legislations that are enacted by respective organizations. It means that each part of the carriage including production, packaging and transportation are controlled by different organizations which lead to obstruction for the entrepreneurs in doing business.

Moreover, the organizations may neglect or refuse to take responsibility in case of any problems arising because they have a limited authority. So it is necessary to have a competent authority be responsible directly in the carriage of dangerous goods by air for the harmonization and convenience.

When compared with Australia, for consignment and carriage of dangerous goods, legislative potency is granted, and compliance required, with the ICAO Technical Instructions through the act. There is the competent organization “CASA” that authorizes and fulfills this role. The authorization is obviously included in CASR Regulations Part 92. The regulations consist of all details that are required for the carriage of dangerous goods by air and they are applied to all aircraft related matter such as dangerous goods manual, properly trained employees, support document, record and the holding of record, dangerous goods incident investigation and decontamination and report procedures etc.

For New Zealand, there is Civil Aviation Rule Part 92 which provides general requirement and controls all the carriage of dangerous goods. All matters in the regulations have the same content as Technical Instructions for the safe transport of dangerous goods by air, and the IATA Dangerous Goods Regulations include the necessary detail about airline industry standard and convention.

In Thailand, although there are some related regulations on the carriage of dangerous goods by air, they are not adequate. Any particular act is not able to regulate the carriage of dangerous goods efficiently and sufficiently because most of them are subordinate laws, and they cannot be applied uniformly to all cases and are too complicated in practice. Since the dangerous goods accidents can severely harm life, health, property or environment, it should have a law that can be strictly enforced For example, there is no provision which mentions about the penalties so it is necessary to have the specific law to enforce in this matter.

Thus, as a preliminary solution, the author suggests enacting ministerial regulations under the Air Navigation Act B.E. 2497 as soon as possible. Because enacting a law has to be considered by the legislative assembly, it has a complicated process and also takes time to enact the law so it cannot be immediately amended or applied with the current situation. Therefore, enacting the ministerial regulations is the suitable way to solve the encountering problem because it can provide more detail under the existing act and can be promptly amended or implemented together with the international regulations.

For the long term goal, the author suggests framing a proper law on the carriage of dangerous goods by air because the law on this matter is essential as it has an effect on the society and people. Moreover, the Air Navigation Act does not specify penalties for carrying dangerous goods or not complying with regulations, so the proposed law should specify the suitable penalties and responsibility in case of compensation for damages; both civil and criminal.

Furthermore, this proposed law should be enforced for the carriage of dangerous goods by air for both domestic and international operators because they have the same procedure and damage in case of occurrence of an accident. However, there may be some sections that are applicable especially for the international carriage, for example, the documentary in English.

Moreover, the law on the carriage of dangerous goods by air should be amended every two years, same as under the UN recommendation. It should be enacted in ministerial regulation because it is simpler and faster to amend the

ministerial regulation than enacting the act. The reason to amend this law every two years is because of the various types of dangerous goods and the continuous improvements in the transportation technologies, thereby increasing the chance of causing more damage than the past. Therefore, the law should be amended and updated appropriately for the current situation.

To solve Thailand's civil aviation and for it to be in compliance with the standards of the “International Civil Aviation Organization (ICAO)”, according to “Significant Safety Concerns (SSC)”, some of the important measures are improving the certification of transportation of dangerous goods by air by setting up a special unit responsible for issuing the rules and regulations concerning transportation of dangerous goods as well as drafting a Dangerous Goods Manual and a Dangerous Goods Inspector Manual.

The organization that will enforce the specific law should have the knowledge and understanding in the carriage and state of dangerous goods because in the present there is no specific organization who directly responsible in this matter. Therefore, a specialist committee should be appointed to consider the law. Furthermore, they also should have specialization in other languages.

The personnel is an important part in controlling the carriage of dangerous goods and needs to be of the same standard as the international one. Thus, there should be a training course on the carriage of dangerous goods by air for the personnel to improve its potential and specialization in this matter.

In conclusion, Thailand should make amendments to laws to make the carriage of dangerous goods by air meet the international standards. This is because airline industries play an important role in the national economic system. Furthermore, it is also for the protection of people’s life, health, property and development of Thai airline industries simultaneously.

4.2.3 Problems of the substance of the law

According to a study, there are some regulations that can be enforced in the carriage of dangerous goods by air but they are still inadequate because they do not cover all the matters as desired.

In Department of Civil Aviation Regulation No.92, they were applied and translated from the Technical Instruction for the transportation of dangerous goods. However, some parts cannot be applied in this regulation and can have an effect in practice such as the limitation on the transport of dangerous goods, shipper's responsibilities, dangerous goods transportation documents, compliance and inspection systems.

Moreover, this regulation does not have the penalty that can cause the problem such as the punishment in the event of an infringement.

4.2.4 Recommendations Requiring Details to Improve Existing Law

According to the study, Thailand has only the subsidiary legislation to govern the carriage of dangerous goods by air and it does not cover some parts when compared with the international regulations.

So to enact the act, the international regulation should be the model regulation to apply in Thai law by taking into concern the proper enforcement. It may be amended or some part may be added that can be adapted as per the situation in Thailand. It not only solves the present problem but it can also make uniformity and international standard in the carriage of dangerous goods system. Moreover, it can create the reliability from the foreign countries.

These are the scope of content that should be specified in the act as following:

1) The enforcement of the act

The act should specify the proper definition of the dangerous goods because this clause will define the criteria of items that shall comply with this act. Because

some goods can be dangerous by themselves, on the other hand some goods may be dangerous only during carriage. Furthermore, the act shall be enforceable with the dangerous goods that are carried by air both domestic and international.

2) The definition

In addition, it should define the meaning of the words that deal with the carriage of dangerous goods by air for an easy way to understand because some words are technical terms such as “marking”, “labeling” and “limitation”.

3) Classification

Classification is the basic knowledge that should be provided in the act. It is also the crucial criteria to control the dangerous goods as applied with the international regulation. There are nine classifications.

4) Training

It is necessary to specify the proper training course especially for the responsible personnel concerned with the safety and responsibility in the carriage of dangerous goods. The training should have the detail about the hazards of dangerous goods, safe handling of dangerous goods and emergency response procedures in case of occurrence of an incident or accident.

5) Safety Provisions

It should have the safety procedure to conduct the dangerous goods safely. By providing the preventive measures for each kind of dangerous goods and the proper solution in case of occurrence of an incident or accident to minimize the damage that causes from the dangerous goods.

6) Packaging

It should have the detail about packaging; what the package should be and how to pack by applying the international regulations.

7) Procedure

The procedure in the carriage of dangerous goods must consist of the detail on packing, marking, labeling, transportation documentation, shipper's responsibility, risk management, safety measure, compliance and inspection system.

8) Dangerous Goods list

It should be updated according to the international regulation to make globally harmonized classification.

9) Penalty

In the present, the regulation does not enact about the penalty so in the act it must provide the penalty for a person who breaks or violates the law. The purpose is to punish a person who willfully offends and motivate people to comply with the law. By considering the level of guilt, proper punishment should be applied both civil and criminal.

4.3 The Advantages of the Specific Law on Carriage of Dangerous Goods by Air

There are many advantages if Thailand enacts the specific law on carriage of dangerous goods by air as follow:

1.) The advantage for business and economy

By having a specific law on the carriage of dangerous goods by air in Thailand, the carriage can be controlled so as to be systematic and effective. It can reduce the risk that causes the accident and the problem of the standard of the carriage to make the carriage business more convenient. It can increase the confidence of the foreigners to travel in and accept the Thai airlines. Moreover, it can support investment in the carriage of dangerous goods more than the past.

2.) The advantage for society

If there is a specific law to control in this matter, it can improve the safety standard in the carriage of dangerous goods by air. It can prevent and minimize the dangers that cause severe harm to life, health, property or environment. Moreover, if

there is a specific law, it can reduce the incident or accident that can occur from dangerous goods.

3.) The advantage for public

Accidents that are caused by the dangerous goods can severely affect not only the private operators but also the state ones. Such accidents can reduce the confidence of carriers from the other countries. So if there is a specific law which can control the carriage and make it more systematic and effective, it will be advantageous for public. It can make the standard in Thai's airline industry to meet the international requirement and increase the confidence to the foreign countries.

4.4 Preventive Measure in Practice

1) Information to Passengers

It is not practical to provide personal training on the Regulations to all passengers. However, we can bring to their attention knowledge of the items that cannot be carried on board an aircraft, either as check-in or as carry-on baggage.

Information must be relayed to the passengers about the classification of dangerous goods that are forbidden from carriage on board the aircraft.[149]

As a minimum, this information must contain:

(1) Information on the passenger boarding pass or in another manner such that before or during the check-in procedure, the passenger can get to know the information.
(2) Notices warning passengers as to the classification of dangerous goods that are forbidden for carriage on board the aircraft that;

- Clearly present at the airport such as ticket counter, check in counter, boarding area and baggage carousel area;

[149] Flight Safety Foundation, *"Generic Checklists Focus Response to In-Flight Dangerous-goods Incidents"*, www.flightsafety.org (last visited May. 17, 2016).

- Relay information to the passengers that “For safety reasons, carriage of dangerous goods in your baggage is forbidden: lighters, matches, gas, paints, bleach, fireworks, etc. to ensure your baggage is safe”.[150]

A staff at check in counter have to ask the passenger to confirm they do not carry the prohibited dangerous goods on board, and find more information if the baggage contains any suspicious item. Because sometimes the normal item may consist of the dangerous substance.

There are many people related to the “transport chain”, from the passenger to the staff involved in the approval of checked baggage, handling and boarding of the passenger, the ramp staff handling passenger baggage and cargo as well as the aircraft flight and cabin crew. If everyone in that “chain” is careful of dangerous goods and the regulations regarding their carriage, safety will be improved.[151]

2) Prevention Strategies

Every day, dangerous goods are carried by passengers and cargo aircrafts. They should be properly identified, handled and packaged to prevent a risk in the carriage. However, if any incident occurs on board, passengers and crew may be injured so the operators and the crew members should have the Prevention Strategies as following:

- Inform passengers with the picture or notice at check-in and ticket counter;
- Ground staff, passengers, and the cabin crews must strictly comply with the regulations concerning the carriage of dangerous goods;
- People who are involved in dangerous goods must have the knowledge of

[150] Rapeeporn Tunjoy, *“Carry-on items Restrictions Based on Safety Standard”*, http://www.east.spu.ac.th/journal/booksearch/upload/1464-005_carry.pdf (last visited May. 17, 2016).

[151] *Id.*

handling, procedures and the action that have to be taken in case of an emergency.[152]

It is important to note the following key points:

(1) The airline operator and cabin crew should have received approved training courses in accordance with ICAO requirements. The training must be approved by the competent authority and valid for 2 years.

The training that they will take into report as following:

- The hazards of dangerous goods
- Safe handling procedures
- Emergency response procedures in case of incident occurred.[153]

(2) Operators should ensure that passengers are aware of dangerous goods regulations by giving the information and policy about the carriage of dangerous goods on board which is noticeable.

(3) The dangerous goods manual must comprise of dangerous goods in detail and safe handling procedures. It must be maintained in accordance with changes by ICAO.

(4) To improve their dangerous goods in-flight incident procedures, the operators should refer to IATA and ICAO Emergency Response Guidance.[154]

4.5 Conclusion

Presently, although Thailand has some regulations to control the carriage of dangerous goods by air, these provisions of existing law are insufficient to cover all aspects of this matter. So it is appropriate to adopt the international regulations with

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[152] Flight Safety Foundation, *supra* note 149.

[153] *Id.*

[154] *Id.*

Thai law and at the same time develop the carriage of dangerous goods by air in practical sense to meet the requirements of the international standard.

CHAPTER 5
CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion

Over the years, as agricultural and industrial sectors have witnessed rapid growth, the demand for products has risen as well, leading to increase in the transportation of goods. The goods are of different varieties and kinds, one of them being dangerous goods. Normally, in the international carriers, the magnitude of dangerous goods carried is always enormous. As a result, there is a chance it may cause the serious damage to people, properties and environment; so there is a need for proper regulation to control and regulate the carriage of dangerous goods.

The organization which oversees the carriage of dangerous goods is United Nations, which has issued "United Nations Recommendations on the Transport of Dangerous Goods" as model regulations. Later, other organizations which deal with the carriage of dangerous goods have also framed specific regulations on this matter. International Civil Aviation Organization has enacted "Technical Instructions for the Safe Transport of Dangerous Goods by Air" and International Air Transport Association has enacted "IATA Dangerous Goods Regulations" to control and regulate the carriage of dangerous goods.

In Thailand, it appears that this issue has not been given sufficient consideration, according to the case study in 2015 which observed that Thai DCA does not meet the requirement of ICAO in Significant Safety Concerns (SSC). Resultantly, it has had an effect on the Thai airlines' permit to enter Japan and China, and therefore, Thailand should consider enacting the specific law on the carriage of dangerous goods by air for safety, standard and harmonization with the international regulation.

The carriage of dangerous goods by air in Thailand is a prolonged problem because Thailand uses the "Hazardous Substance Act B.E. 2535" to be a model regulation for all aspects of hazardous substances such as production, importation,

exportation or possession. However, in the case of the carriage of dangerous goods, though this act may be applied to domestic matters, but it cannot be applied to the international carriage of dangerous goods, multimodal transportation, packaging especially, due to inconsistency between Thai law and International regulation.

Although the Hazardous Substance Act B.E. 2535 has provisions relating to a chemical or hazardous substance, it does not clearly state about the carriage of dangerous goods and all aspects dealing with the carriage of such dangerous goods by air such as the packaging for the exportation by air.

So there should be a separate law on the carriage of dangerous goods by air from Hazardous Substance Act B.E. 2535 and the specific law should be compatible together with the international regulation such as "UN Recommendations on Transport of Dangerous Goods, ICAO-Technical Instruction, and IATA Dangerous Goods Regulations".

When compared with Australia, which is a member of ICAO, it has a great potential, and has been successful in the airline industry. It is the leader of the safety airlines in the world. "CASR Regulations Part 92", the law on governing the carriage of dangerous goods by air, was adopted with the ICAO Technical Instructions through the act. Moreover, there is the competent organization "CASA" that authorizes and fulfills this role. These regulations include all details that are require for the global harmonized standard and they are applied to all aircraft related matters.

In the case of New Zealand, the airline in this country is one of the safest airlines in the world because they are concerned about the safety measures both the legal and practical, as a result of which there have been less accidents in the past 10 years. There is Civil Aviation Rule Part 92 which controls the carriage of dangerous goods and it has the same content as Technical Instructions for the safe transport of dangerous goods by air, and the IATA Dangerous Goods Regulations include the necessary detail about airline industry standard and convention.

In conclusion, it is better if there is a standard and correct procedure in the carriage of dangerous goods in Thailand because it can prevent the damage that can severely affect life, property or environment.

5.2 Recommendations

The law on governing the carriage of dangerous goods by air is still new and therefore it is necessary to improve it to harmonize with the international standard. Although there are some related laws on this matter in Thailand, these have some problems that should be improved as follows:

Firstly, Thailand has the Hazardous Substance Act B.E. 2535 which regulates hazardous material and the Air Navigation Act, Section 26 which states about dangerous goods. But these acts do not cover all aspects regarding the carriage of dangerous goods by air. So it is essential to have a specific law on the carriage of dangerous goods by air in harmony with the International regulations such as "UN Recommendations on the Transport of Dangerous Good, Technical Instructions for the Safe Transport of Dangerous Goods by Air and IATA Dangerous Goods Regulations".

Secondly, although there are regulations on the carriage of dangerous goods in Thailand as the Department of Civil Aviation Regulation No.92, it does not cover all the topics in this matter such as a limitation on the carriage of dangerous goods by air, shipper's responsibilities, dangerous goods transportation documents, compliance and inspection systems. In addition, the related regulations are not comprehensive and are difficult to enforce, so they should be categorized properly so as to be more explicit and clear.

Thirdly, there is no specific organization to control the carriage of dangerous goods by air in Thailand. Thailand also lacks specialists in this matter; so there should be special training classes for the personnel in aviation such as airline's operator, shipper, ground staff and cabin crew.

Fourthly, the Thai DCA should be strict on all airlines carrying dangerous goods by air because an accident caused due to dangerous goods can severely harm the people, properties and the environment. Moreover, it is the way to improve Thai airlines to meet the requirement of the international standard.

Fifthly, the regulation on the carriage of dangerous goods by air in Thailand is not up-to-date when compared to "United Nations Recommendations on the Transport of Dangerous Goods" which are amended every two years to make them suitable for practice in the globalizing world.

Due to the above-mentioned reasons, the author suggests that the law on the carriage of dangerous goods by air should be enacted to solve an entire problem and cover all aspects of this matter. Since the current laws are subordinate laws and not the Parliamentary Act, the author suggests enacting a Parliamentary Act because this matter is very important as it can affect the people and should be thoroughly considered in more details. Moreover, the Air Navigation Act does not specify some parts such as penalties, so it necessary to enact a legislation to cover all subjects.

In conclusion, the author also suggests enacting the ministerial regulations under the Air Navigation Act B.E. 2497, because they can provide more details under the existing act and can be promptly amended or implemented with the international regulations. Enacting the act has to be considered by the legislative assembly, it has a complicated process and also takes time to enact the law so it cannot be immediately amended or applied with the current situation and may affect the development of society and economy. Therefore, the ministerial regulation is the suitable way to solve this problem.

However, for the long-term goal, there should be an act on the carriage of dangerous goods by air because if there is any accident or damage, it can severely affect people's health, life, state properties and the environment. Thus, a new act should be brought into force to cover all aspects of this matter by considering the international regulations.

Law on the carriage of dangerous goods by air should be enforced on both domestic and international carriers because it has the same procedure and the accidents that occur can also harm the people, properties and the environment. However, it should also have some separate articles or provisions that are applicable especially in the international carriage of dangerous goods.

Moreover, a responsible organization overseeing all the aspects should be constituted and should have a training course on the carriage of dangerous goods by air for the personnel because the personnel is an important part of practicing and improving the carriage system.

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