



Biological Pathway Introduction of Quarantine Animal Disease through International Waste at Soekarno Hatta International Airport, Indonesia

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ABSTRACT

International flights coming to Indonesia, in addition to bringing in passengers, also brings in passenger's food waste and garbage from the activities in the airplane. Soekarno Hatta International Airport (SHIA), as one of the busiest airports in Indonesia has great potential as a waste producer. International waste has a higher risk in terms of spreading disease to the environment around the airport, which will ultimately impact human and animal health in general. Waste risk assessment carried by international aircraft as a risk carrier of quarantine animal disease entering Indonesia has never been done. The aim of this study was to identify the biological pathway from the entry of pathogens through international waste and how to prevent it. The results, there were three pathway of international waste management at SHIA. The first pathway, the waste was not unloaded from international aircraft and returned to the country of origin. The second pathway, international waste was unloaded from international aircraft, then destroyed in incinerators inside the airport area. The third pathway, the waste was managed by the inflight catering company and taken out of the SHIA. The third pathway has a highest risk as an entry pathway of quarantine animal disease. There was possibility that food waste was reused as animal feed. Regulations regarding airport waste management is exist, but the implementation is not optimal. The authority and agencies related to international waste at SHIA need to enforce the existing rules about international waste management, to prevent the spread of diseases due to waste.

KEYWORDS: Aircraft, biological pathway, international waste, Soekarno Hatta International Airport, waste management

I. INTRODUCTION

International waste (IW) according to the Canadian Food Inspection Agency is a term that is used to describe the waste from international planes and ships in the port. Food waste which contains ingredients from animals, fish, plant has potential risk for disease transmission to human and animals. International waste also refers to airplane garbage, forfeited materials, manure, and ship's refuse as defined above. All international waste will be handled, transported, stored, and disposed of in accordance with this directive (CFIA, 2012).

Arrangements regarding the handling of airplane food waste are actually contained in Article 54 of Indonesian Law Number 21 of Year 2019 concerning Animal, Fish and Plant Quarantine, which mandates the owners of transportation equipment to carry out supervision related to waste

management of transportation equipment containing material from animals, fish, plants, animal food waste, and animal waste.

Soekarno Hatta International Airport (SHIA) located in Tangerang Banten, is one of the four main airports in Indonesia. The airport has great potential and substantial influence in terms of waste production, resulting from activities in terminals, cargo, offices, parks, and airplane. Increased passengers also increase garbage from airplanes or from the airport environment. During January to December 2016 in all Indonesian Airports, the number of domestic passengers increased 10 percent to 80.4 million people. The international passengers rose 8 percent to 14.8 million compared to the previous year. Meanwhile, SHIA is still the busiest airport in Indonesia, both for domestic and international flights. No less than 20.4 million or 25.35

“Biological Pathway Introduction of Quarantine Animal Disease through International Waste at Soekarno Hatta International Airport, Indonesia”

percent of passengers departed in SHIA for domestic routes and 6.6 million or 44.83 percent for international routes in year of 2016 (BPS, 2017).

Number of planes coming to Indonesia from abroad during year of 2014 until 2018 had rose to 2.57 % per year. Passengers arriving from abroad during the same period also had an average increase of 2.57% per year. The number of international aircraft that arrived at SHIA in 2018 was 48.000 aircraft, carrying 7.5 million passengers from abroad. Meanwhile in 2017, the number of international airline passengers arriving via SHIA was 7.2 million people (BPS, 2019).

According to International Air Transport Association (IATA), aircraft passengers leave 0.82-2.5 kg of trash or an average of 1.43 kg per person, depending on the distance and travel time. Twenty three percent of the trash were leftovers that were not eaten by passengers. Some 17 % is waste that can be recycled (plastic, bottles, old newspapers) (IATA 2014). If a passenger carries an average of 1.43 kg of trash per person, it is estimated that the amount of waste from international aircraft at SHIA in 2018 is approximately 10 tons.

The amount and volume of waste from international flights increases with the increasing number of passengers. Foot and mouth disease (FMD) and African Swine Fever (ASF) can spread through international waste (IW), so the management of IW according to the rules must be applied at Soekarno Hatta International Airport (SHIA) and other international airports in Indonesia. To date, the amount and characteristics of international food waste of animal origin introduced illegally into Indonesia by passengers have not been studied extensively. Hence to our knowledge, there are no published studies which investigate the garbage disposal system from the aircraft to the final disposal site. The objective of this study was to identify the biological pathway from the pathogen entry of the international waste and how to prevent it.

II. METHODS

Observation and interview were conducted upon airport authorities and employees who were in charge with bringing IW to a transfer area, as well as arranging and carrying out the transportation and disposal of IW via approved routes and to approved sites. The observation and interview included special handling on IW. Observations were also carried out during the sample collection and waste transportation from the terminal to final extermination site. All the information in this research is collected through interview and observation.

III. RESULTS AND DISCUSSION

Interviews were conducted at three related agencies that handle airport waste (Agricultural Quarantine Service of

Soekarno Hatta (AQSSH), PT. Angkasa Pura II, and Airport Authority), four airport waste management companies, 19 international airlines, two inflight catering companies that supply food to international aircraft, and one company that annihilates waste in incinerators. Based on the observations, it was found that the waste from the aircraft were not entirely unloaded in the apron. Some of the wastes are brought to the catering company directly from the galley using special vehicles.

Based on the observations and interviews, there are three international waste pathways from international aircraft as seen in Figure 1. The first pathway, the waste was not unloaded from international aircraft and returned to the country of origin. The second pathway, international waste from the plane was unloaded and managed by the airport authority, then immediately taken to the incinerator inside SHIA. The third pathway, international waste from planes is unloaded and managed by inflight catering, then taken out of SHIA area. The number of planes whose garbage was not unloaded, unloaded and managed by airport waste management, and unloaded and managed by inflight catering company is presented in Table 1.

Table 1. Number of aircraft in SHIA 2D terminal (during observation period)

Pathway	Actions against international waste	Number of aircraft
1	Not unloaded	15
2	Unloaded and managed by airport waste management	24
3	Unloaded and managed by inflight catering	14
Total		53

International waste that unloaded and managed by airport waste management was sorted beforehand. Wastes that contain hazardous and toxic waste or cans/glass are separated. This kind of waste to be subsequently destroyed according to the provisions of toxic waste and hazardous materials. The non-toxic waste was destroyed in the incinerator. Seven to ten trucks of international waste were destroyed every day in the incinerator. Currently, there are 7 incinerators working alternately during 24 hours at SHIA.

International waste that unloaded and managed by inflight catering were taken outside SHIA. The waste managed by two different company than taken to the final disposal site in the Tangerang Banten area of Indonesia. Further info from interview, international waste was not get special treatment before being taken out SHIA. other than that, the waste was mixed with kitchen trash, office and surrounding garbage in the catering company area.

Based on observations, aircraft waste that has the lowest risk in terms of disease spread in Indonesia was the first pathway.

“Biological Pathway Introduction of Quarantine Animal Disease through International Waste at Soekarno Hatta International Airport, Indonesia”

Garbage was not unloaded from the plane. The cleaners just clean the plane without bringing the trash down. The waste from aircraft kitchen was also not unloaded. Generally, a short flight distance was used this pathway, although some long flight distance also done this. Airline companies with long flight distances and do not unload trash at SHIA state that according to the company's rule, they are not allowed to unload waste in the destination country.

Garbage from the second pathway consists of cabin waste and catering waste. Both types of waste were put in separate plastic bags. Garbage from the bathroom was also put in a separate bag. According to the rule, those three types of plastic bags should be put in a special international trash bin, but some of the time, the authorized officers were seen putting the international waste into the trash for other uses. SHIA has provided various types of trash bins according to their designation, namely trash bins for international flight, domestic flight, and environmental waste around the apron (outdoor waste bin).

Garbage then carried by a garbage collection vehicle. The waste than transported to the incinerator inside the airport area. The trucks that were used to transport garbage from international aircraft are distinguished from trucks that transport waste from domestic aircraft and environment around apron. The airport waste disposal installation is located approximately 5 km from Terminal 2D. The waste was put on the incinerator at the same day. Every 15-30 minutes, the truck circle around the apron to pick up the trash. No trash bin opened other than authorized officers. The garbage truck is equipped with a tarp that was tied immediately after the garbage was put in.

Plastic bags containing trash from international aircraft must be put in international trash bins, to minimize the risk of officers picking up the trash incorrectly. During the observation as shown in Figure 2, the aircraft cleaners get caught put the trash from international planes into outdoor waste bin. There was a risk that international waste was treated the same as outdoor trash, mixed with trash from the apron environment and finally disposed of in landfills outside SHIA.



Figure 2. Terminal 3 garbage truck. Garbage was put into an outdoor waste bin (not according to regulations)

The international waste was destroyed on the same day at the incinerator. Based on preliminary observations, it was found that the plastic bag was not opened first. The waste was put directly into the incinerator, thereby reducing the possibility of waste polluting the surrounding environment. Final observations with different time intervals, show that cans and glass were removed from plastic bags and placed with other toxic and hazardous waste. Opening the plastic bags to separate the cans and glass poses a risk of contamination on the soil in the incinerator environment. Furthermore, canned waste and glass are destroyed according to the provisions of hazardous and toxic material. Non-canned waste and glass were destroyed on the spot. SHIA has 7 incinerators which work alternately for 24 hours. Every day 7-10 trucks carry international waste to be destroyed.

The highest risk was the third pathways, the garbage managed by the inflight catering company. The waste was taken out of the airport, to a final garbage disposal site, namely Rawa Kucing Landfill at Tangerang. The landfill is approximately 15 km from SHIA.

Waste from food trays and kitchen trash from international aircraft was taken to catering companies. In the garbage bin, aircraft waste was mixed with kitchen trash, office and surrounding garbage in the catering company area, as shown in Figure 3. The garbage without any special treatment were carried by the garbage truck out of the airport. During the observation period, it was seen that the waste from the aircraft was immediately thrown into the trash bin without selecting it first. Waste inside the plastic bag from aircraft was not opened.



Figure 3. Waste handling in a catering company

Waste disposing from aircraft to landfills is the easiest method, but has the highest environmental impact (Blanca-Alcubilla *et al.* 2019). Waste in the catering business is categorized into production waste and consumer food waste. The residual waste from production comes from overproduction, as a result of misstating the number of servings or mistakes of staff in preparing food. Consumer food waste comes from leftovers that are not consumed by

consumers. The amount of food waste from consumers takes up a larger proportion (Ross 2015).

Based on interviews with inflight catering company, the waste management is handed over to the designated company. By the company, the waste from international aircraft before being disposed of, was sorted first, then mixed with other waste and some of it was reused. The rest of garbage that gone to the landfill carries the risk of spreading disease to the environment. Several places in Tangerang are pig farming areas. The pigs are usually fed leftovers from restaurants around the farm. There is no definite data as to whether the leftover aircraft food from international waste was also used by pig breeders for animal feed.

International waste can spread antibiotic-resistant bacteria. Riasari (2020) said that antibiotic-resistance bacteria from left-over food in international waste through Soekarno Hatta International Airport shows a high level of antibiotic-resistant, which are Nalidixic Acid (57%), Cefoxitin (32%), Ampicillin (26%), Amoxicillin (15%), Tetracycline (9%), Cefotaxime (5%), Kanamycin (3%), and the lowest is Sulfatrimethoprim (1%). The *Enterobacteriaceae* from sample also shows the intermediate resistant level of antibiotic, which are Cefotaxime (37%), Cefoxitin (13%), Tetracycline (6%), Kanamycin (6%), Amoxicillin (4%), Nalidixic Acid (4%), Sulfatrimethoprim (2%), and Ampicillin (0%). Reducing the risk of its spread through international waste must be the concern of airport management, as well as passengers.

The first pathway, the waste was not unloaded from international aircraft and returned to the country of origin. The risk of exposure from this first pathway was negligible.

The second pathway, international waste was unloaded from international aircraft, then destroyed in incinerators inside the airport area. Actions taken by the Airport Authority for the second pathway are: (1) The Airport Authority has carried out supervision, (2) The Airport Authority has socialized the implementation of correct waste management. The facts based on observations, there were aircraft cleaners who carry out tasks that are not according to the rules. Actions taken by the Agricultural Quarantine Service of Soekarno Hatta (AQSSH): (1) AQSSH has not supervised the waste disposal process from the apron to the incinerator, (2) AQSSH has not conducted international waste sampling at the apron for laboratory tests. The facts obtained from observations, that all international waste was brought to the incinerator and destroyed immediately. The risk of exposure from the second pathway was negligible.

The third pathway, the waste was managed by the inflight catering company and taken out of the SHIA. The catering staff stated that the waste was sorted first, the parts that can

still be used will be reused. The parts that cannot be used, such as wet waste from food leftovers, the action was unknown. There was a possibility that the waste was used as animal feed. The actions taken by the Airport Authority for the third pathway are: (1) The Airport Authority has carried out supervision, (2) The Airport Authority has conducted socialization on the implementation of correct waste management. In fact, the inflight catering has not treated international waste according to regulations. Actions taken by AQSSH: (1) AQSSH has not supervised the process of waste transporting and disposing from the catering company out of SHIA, (2) AQSSH has not taken international waste samples at the catering company for laboratory tests, (3) AQSSH has not carried out appropriate quarantine measures regulations. In fact, the treatment given to international waste outside the SHIA area is unknown. The risk of exposure from the third pathway was moderate to high.

Based on the description of the international waste disposal pathway above, the risk of moderate to high exposure can occur in aircraft waste managed by inflight catering company. Until now, information about the treatment of waste brought out of SHIA has not been obtained. There is a risk that food waste from international aircraft is used as animal feed, so that the risk of transmitting diseases such as foot mouth disease (FMD) and African swine fever (ASF) can occur.

Garbage from international aircraft that land at United States airports, especially planes from countries infected with foot and mouth disease (FMD) must be destroyed without exception. The waste includes meat and its products, milk (fresh, pasteurized, condensed), dairy products (cheese, cream, yogurt), eggs, including fruit and vegetables (USDA 2015). Japan Airlines (JAL) enforces the same. All food scraps from international flights that enter Japanese airports are destroyed in the incinerator without exception (JAL 2018). KLM as the Dutch state flight carrier implements that 100% of its aircraft catering food must be destroyed in an incinerator, none of which goes to landfills (KLM 2017).

In the European Union (EU), catering waste from international aircraft of fellow EU countries is not considered a high risk, but if it comes from non-EU countries, the catering waste is considered waste containing food scraps from animals and their products. The catering waste is assumed to have a potential risk of spreading diseases that can threaten animals and humans, if not destroyed according to regulations (Blanca-Alcubilla et al. 2019).

Catering waste dumped out of the airport area actually violates the rules which state that trash from international aircraft must be destroyed immediately. Article 25 of Law No. 16/1992 concerning Animal, Fish and Plant Quarantine states that other carrier media carried by transportation

means and unloaded at the entry point must be destroyed by the owner of the transportation means concerned under the supervision of the quarantine officer. Article 54 of Law Number 21 of 2019 concerning Animal, Fish and Plant Quarantine, paragraphs 3 and 4 states that international waste culling must be carried out at the entry point or at other designated places. Destruction is carried out through coordination and assistance of the person in charge of the entry point, in this case SHIA authority.

Further interviews with airport caterers, the regulations related to the disposal of waste from international aircraft were known, but their implementation has not been carried out. The Airport Authority has not provided the best solution in handling the large amount of aircraft food waste from the catering company. According to the regulations, this waste must be destroyed in an airport incinerator, but there are obstacles in transporting waste from the catering company to the incinerator area.

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The enforcement of regulations related to international waste must be further emphasized by the relevant agencies at SHIA. SHIA has attempted to enforce the rules, but their implementation has often been ignored. Regulations related to international waste management by implementing officers in the field must be understood and implemented properly.

IV. CONCLUSIONS

At Soekarno Hatta International Airport there are three pathway of international waste disposal. The first pathway, the waste was not unloaded from international aircraft and returned to the country of origin. The second pathway, international waste was unloaded from international aircraft, then destroyed in incinerators inside the airport area. The third pathway, the waste was managed by the inflight catering company and taken out of the SHIA. The third pathway has a highest risk as an entry pathway of quarantine animal disease. There was possibility that food waste was reused as animal feed.

Regulations regarding airport waste management is exist, but the implementation is not optimal. The authority and agencies related to international waste at SHIA need to enforce the existing rules about international waste management, to prevent the spread of diseases due to waste.

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CONFLICT OF INTERESTS

The authors declare that they have no conflict of interest.

REFERENCES

1. Blanca-Alcubilla G, Bala A, Hermira JI, De-Castro N, Chavarri R, Perales, R, Barredo I, Fullana-i-Palmer P. 2019. Tackling international airline catering waste management: Life zero cabin waste project. State of the art and first steps. *Detritus Multidisciplinary J for Waste Resources and Residues* (03):159-166. doi:10.31025/2611-4135/2018.13698
2. [BPS] Badan Pusat Statistik. 2017. Statistik Transportasi Udara 2016 (Air Transportation Statistik 2016). ISSN: 2598-5604. Katalog: 8303003. <https://www.bps.go.id/publication/2019/11/27/2ee66ee6da342041f1901fb0/statistik-transportasi--udara--2016.html>
3. [BPS] Badan Pusat Statistik. 2019. Statistik Transportasi Udara 2018 (Air Transportation Statistik 2018). ISSN: 2598-5604. Katalog: 8303003. <https://www.bps.go.id/publication/2019/11/27/2ee66ee6da342041f1901fb0/statistik-transportasi--udara--2018.html>
4. [CFIA] Canadian Food International Agency. 2012. International waste directive. www.inspection.gc.ca/animals/terrestrialanimals/imports/policies/general/2002-17/eng/1321050654899/1323826743862#intro.
5. [IATA] International Air Transport Association. 2014. Airline cabin waste. <https://www.iata.org/policy/environment/Pages/cabin-waste.aspx>.
6. [JAL] Japan Airlines. 2018. Aircraft cabin waste recycling. [internet]. <https://www.jal.com>
7. [KLM] Koninklijke Luchtvaart Maatschappij. 2017. Minimise our impact on the environment. <https://www.klm.com>
8. Riasari JR, Sudarwanto MB, Indrawati A, Latif H, Krishnan NR, Pisestyani H. 2020. *Enterobacteriaceae* Resistance of Antibiotic from Left Over Food of Wastes in International Flight at

“Biological Pathway Introduction of Quarantine Animal Disease through International Waste at Soekarno Hatta International Airport, Indonesia”

Soekarno Hatta International Airport. *Acta Veterinaria Indonesiana*. 8(1):47-54. P-ISSN 2337-3202, E-ISSN 2337-4373

9. Ross J. 2015. Food waste in an airline caterer’s production kitchen. Thesis, Master of Dietetics University of Otago, Dunedin New Zealand. <https://hdl.handle.net/10523/5486>
10. [USDA] United States Department of Agriculture. 2015. Procedure for airports to request APHIS approval to receive international commercial passenger aircraft or international commercial cargo aircraft. <https://www.aphis.usda.gov/import.../InternationalCommercialPassengerCargo.pdf>.

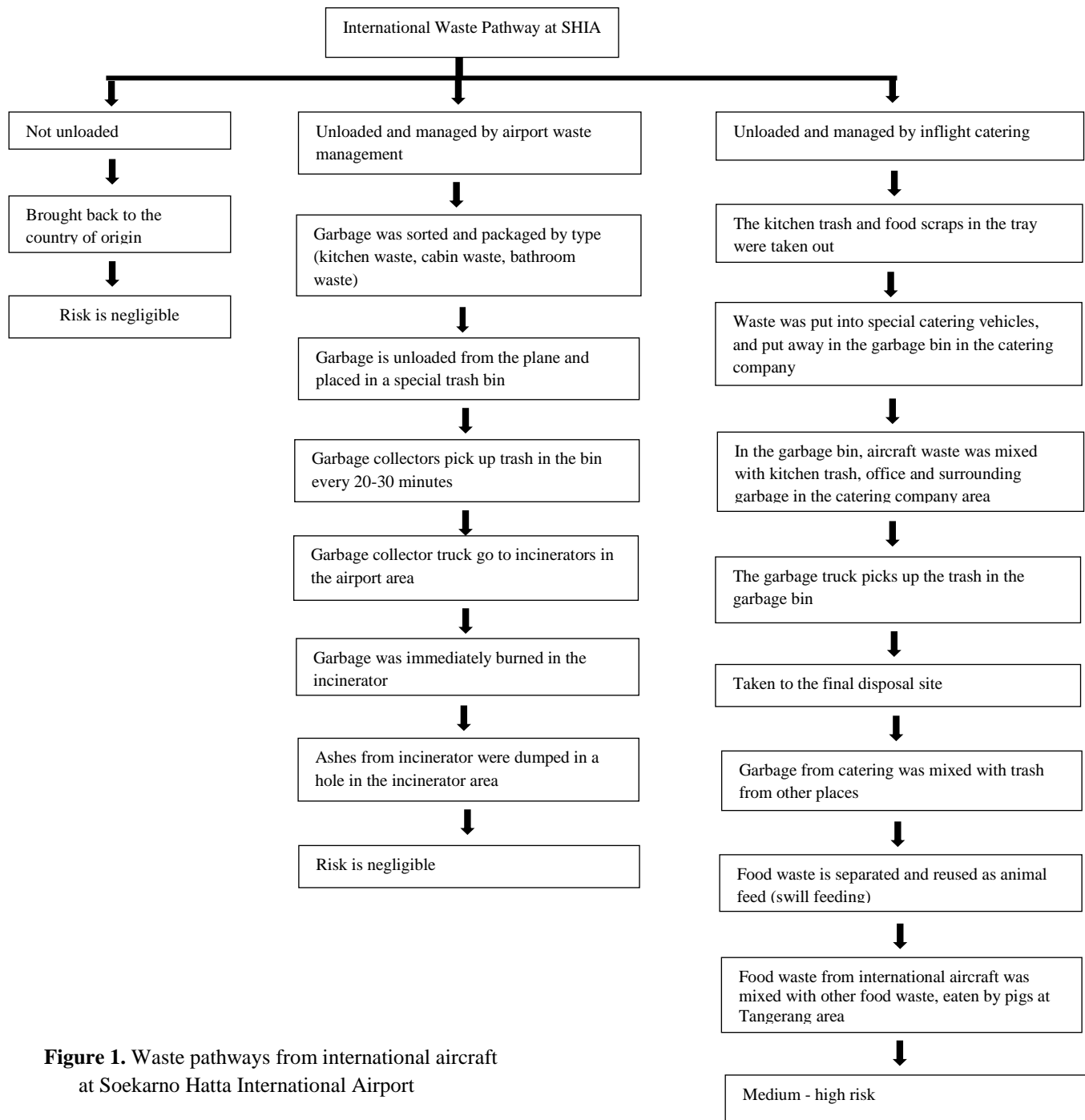


Figure 1. Waste pathways from international aircraft at Soekarno Hatta International Airport