The Compliance of the Eco-Green Airport Concept Implementation in Ahmad Yani International Airport Semarang

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Abstract: Airports in Indonesia must implement an eco-green airport program, including air quality, energy, noise, soil, water, waste, natural environment, socio-economic and public health. Airport activities affect the quality of the environment, including water, air, and soil quality. Based on environmental documents at Ahmad Yani International Airport Semarang, pH and total coliform parameters of liquid waste exceed the quality standard and soil management that have not run optimally. This study used a descriptive observational approach with quantitative methods and using a saturated sampling technique. The subjects included five airport staff. The study aimed to identify the compliance of the environmental management, including air quality, energy, noise, water, soil, waste, natural environment, and socio-economic and public health aspects. All environmental management aspects the fulfillment indicators based on Guidelines for Implementation of Environmentally Friendly Airports (Eco Airport). The instruments used to identify indicators were questionnaires and observation sheets and compared to eco airport guidelines. The results of compliance of eight of the eco-green airport included air quality management (100%), energy management (60%), noise management (80%), water management (100%), soil management (83.33%), waste management (100%), natural environment (100%), and social, economic, and public health (100%). The average compliance of the environmental management with the eco-green airport guidelines was 90.42%. It is necessary to fulfill points on energy management (use of biofuels), noise management (noise absorber facilities), waste management (effectiveness of dosing pumps), and soil (cleaning of waste without chemicals, maximizing 3R principle).

Keywords: Airport, Eco-Green Airport, Environmental Components, Environmental Management, Quality.

Introduction

The airport is one of the supporting facilities that have a solid activity due to community needs. Therefore, airport support the needs by providing airplanes for time efficiency, such as work, tourism, and others. The existence of an airport with all its activities results in the impact of pollution generated by air transportation, energy management, and waste in the airport area. Airport activities such as produce waste and can affect the environmental quality in the airport area, such as offices, activities at the passenger terminal, operations in the airside area, aircraft repair hangars, cargo, and aircraft galley. In addition to airport operational activities, the environmental quality of the airport area can also be affected by activities from community settlements, vehicle operations, restaurants, and other business activities. (International Civil Aviation Organization (ICAO, 2019).

Airport operational activities that can affect the environment need to so that the environmental quality of the airport area does not decrease. The quality will decrease if it doesn't manage properly. It will affect human health. Previous research has shown that inappropriately managed airport operational activities could produce wastewater with parameters exceeding the threshold value (Raffah, 2021), noise, and public perception (Agrayanto, Kusnoputranto, and Utomo, 2020).

One of the efforts to consider environmental aspects in the airport operational activities is to carry out an environmentally friendly airport concept (eco airport). A friendly airport or Eco Airport is an airport that has taken measurements of several components that have the potential to affect the environment to create a healthy environment at the airport and its surroundings. It is in accordance to the Government Regulation of the Republic of Indonesia Number 40 of 2012. The application of this concept is also in line with Law No. 1 of 2009 concerning Aviation regarding the stipulation of airport obligations in Indonesia to apply the eco airport concept. (Law of the Republic of Indonesia, 2009).

International standards for eco-green airports that have been implemented in Japan are response to climate change, the use of resources, environmental harmony, and environmental management. (Kansai Airports Tech. HQ, 2018) The supporting components of the airports support energy savings by applyint the surrounding environment such as designing eco buildings, energy conservation, waste and water management, and so on. It was based on ICAO (International Civil Aviation Organization the Eco Design of Airport Buildings) in the Eco Airport Toolkit. In Indonesia, referring to the Guidelines for the Implementation of Environmentally Friendly Airports (Eco Airport) Number: SKEP/124/VI/2009 the program in the eco airport concept includes environmental management from the aspect of the air quality, the use of alternative energy, the noise control, the use of clean water, the soil pollution control, management and utilization of 3R (Reduce, Reuse, Recycle) waste, the preservation of the natural environment, and monitoring of public health as well as socio-economic and cultural aspects. (Raffah, 2021).

The program that supports the implementation of eco airports is Healthy Airports as stated in the Regulation of the Minister of Health of the Republic of Indonesia Number 44 of 2014. It defines the airport conditions that are safe, comfortable, clean, and healthy and doesn't have the potential to pose a public health risk to everyone who carries out activities in the area. There are three points to fulfill a healthy airport. They are the implementation of environmental health, the fulfillment of facilities, and the improvement of clean and healthy living behavior, which refers to the eco airport concept. (Regulation of the Minister of Health of the Republic of Indonesia, 2014). The presence of Law Number 1 the year 2009 concerning Aviation related to the determination of airport obligations in Indonesia to apply the eco airport concept, Angkasa Pura I has implemented the eco-green airport concept at several airports, namely Soekarno Hatta Airport in Tangerang, I Gusti Ngurah Rai Airport in Bali, Juanda in Surabaya, and General Ahmad Yani Airport in Semarang. (PT Angkasa Pura I Eco-green Airport, 2018).

Ahmad Yani International Airport Semarang is one of the airports in Indonesia that has planned to apply the eco-green airport concept since 2014 and will start implementing it in 2018. The implementation of this concept aimed to create environmentally friendly management practices (not harming the surrounding environment). (DJPUK, 2019) There are elements to be

considered in the development of the airport: the terminal layout that is designed to protect the public from noise, minimize energy through building design and characteristics, energy resources and conservation, HVAC operation, waste management, and water management and conservation in the eco airport concept. (International Civil Aviation Organization (ICAO), 2019). In its application, Ahmad Yani International Airport Semarang built the concept of an airport on the water (floating) with an artistic building design accompanied by a go green component. The building is equipped with large windows so it got enough sunlight to minimize energy inside the airport. The street lights on the airport access road use solar cells, then the water treatment used reverse osmosis with pond water for airport operations. All environmental adpects should be considered, so that the realization can be proceed according to the concept.

During its operation, the airport performs routine measurements of each environmental quality included in the eco-airport component. Based on a preliminary study in the RKL-RPL document Semester I 2020 Ahmad Yani International Airport Semarang, from the results of wastewater measurements in July 2020, the total coliform parameter was 3500/100 ml, and the pH was 4.2. Based on the Regulation of the Minister of Environment and Forestry Number 68 of 2016 concerning Domestic Wastewater Quality Standards, the maximum level for the total coliform is 3000/100 ml, and the pH is 6.0-9.0.

In addition, it was found that liquid waste has not been maximized. As a result, it needs to be studied further regarding the implementation of the eco airport at Ahmad Yani International Airport Semarang to maintain and prevent the impact of airport operational activities. The impacts produced by the airport is closely related to environmental pollution and public health t So that it can't reduce the airport image and realize sustainable development for the airport through the application of the eco airport concept. (Agustini, 2011). Based on this description, it is necessary to know more about the management of environmental components in the application of eco-green airport at Ahmad Yani International Airport, Semarang.

Methods

This study used a descriptive observational approach with quantitative methods. It aimed to describe the collected data in detail regarding the implementation of an eco-green airport at Ahmad Yani International Airport, Semarang. The subjects and variables in this study were observed once at the same time. The populations were five airport staff involved in the eco airport component in the field of environmental management. The determination of the sampling used in this study is a saturated sampling technique. The samples were the population of the airport which include staffs or officers who have a role that is directly related to environmental management at the airport. The variables in the study were environmental components based on the Guidelines for the Implementation of Environmentally Friendly Airports (Eco Airport) Number: SKEP/124/VI/2009.

These components included: a) The air quality with five points of environmental management efforts covering landscape/airport gardens, the land use, the hard stem and leafy plants, the policies forbidding smoking, and the monitoring of ambient air quality; b) The energy efficiency with five standard points covering the energy savings, the use of bio-diesel, the use of vegetable oil, the use of solar/solar energy, and the Building Automatic System (BAS); c) The noise with five standard points covering the noise-canceling buildings, the noise-canceling

plants, the earth embankments, the plant arrangements, the personal protective equipment (PPE) according to the noise risk level; d) The water with six standard points covering the use of rainwater, the water storage tanks, the management of drainage hygiene, the Waste Water Treatment Plant (IPAL), the sanitation maintenance, the water recycle; e) The land with six standard points covering the efforts to clean up waste without chemicals, the used oil reservoirs, the special B3 shelters, the oil management involving 3rd parties, the 3R principles (reduce, reuse, recycle), and the save paper use; f) The waste with six standard points includes temporary waste storage, the used oil reservoirs, WWTP, the routine inspection of waste water quality; g).

The natural environment with five standard points covering, preserving protected plants, preserving protected animals, pest control, habitat management studies, and cutting grass; h) The socio-economy and public health with eight standard points covering height control of plants and growing objects, control of surrounding community activities, airport alternative roads, community empowerment, environmental development, health monitoring of surrounding communities, health facilities at airports, smoking area, plant height control and things grow, and also the implementation of a healthy airport. (Department of Transportation DJPU, 2009). It was rated 100%, if each components was fulfilled. If it was not, then the component was fulfilled divided by the total of each multiplied by one hundred percent.

The research data sources used primary data and secondary data. The former was in the form of information on efforts to deal with the airport environment from interviews, observations to observe environmental management included in eco-green airports and healthy airports. Secondary data came from literature, airport permit documents, periodic test results, and airport eco airport documents. The instrument was in the form of interview guidelines to obtain in-depth information regarding the eight components of the implementation of eco-green airports. In addition, there were observation sheets in the form of tables containing the fulfillment of efforts to handle environmental parameters. Moreover, observation and documentation tools were used to take pictures and record sound.

In this study, interviews were conducted to obtain in-depth information regarding the environmental management efforts at Ahmad Yani International Airport, Semarang. The observations at the research site were conducted to strengthen the information provided by the resource persons. It is carried out based on the checklist table of the Guidelines for the Implementation of Environmentally Friendly Airports (Eco Airport) Number: SKEP/124/VI/2009 and the Self-Assessment Sheet of the Regulation of the Minister of Health of the Republic of Indonesia Number 44 of 2014 concerning the Implementation of Healthy Ports and Airports. The fulfillment of standard points was seen based on interviews, observations, and documentations that supported the eco licensing documents, environmental monitoring reports, and related regulations. The instruments were done to identify the suitability of the programs and describe the facts that occur in the field.

Then, the researcher analyzed the data based on the Guidelines for the Implementation of Environmentally Friendly Airports (Eco Airport) Number: SKEP/124/VI/2009. Kf all the standard points in each environmental component have been fulfilled, then it has a percentage of 100% compliance.

Result

Ahmad Yani International Airport Semarang has made environmental management efforts based on the company's environmental policies and applicable regulations, and supported by RKL-RPL documents and environmental quality inspection results. However, there were some aspects that have not implemented yet by the applicable regulations. Therefore, there ks the need to be input for the airport to perfect the programs that conducted to support the eco-green airport.

1. The Implementation of Eco-green Airport Ahmad Yani International Airport Semarang

The identification result of the environmental management fulfillment efforts with each points of compliance with standards based on the Guidelines for the Implementation of Environmentally Friendly Airports (Eco Airport) Number: SKEP/124/VI/2009.

Table 1. Eco-green Airport Air Component Observation Checklist Table

Variable	Fulfillment	
	Available	Unavailable
Airport landscape/garden	✓	
The use of airport land	✓	
Plant with hard trunk and lush leave that does not invite birds	✓	
No smoking policy	✓	
Monitoring of ambient air quality	✓	
Total	5 point	-

Source: primary data 2021

Based on table 1.1 of the air quality components referring to the Eco Airport Guidelines SKEP/124/VI/2009, Ahmad Yani International Airport Semarang has managed air quality to realize the implementation of the eco-green airport. It can be seen that each points have been fulfilled, so the percentage is 100%.

Table 2. Checklist Table for Eco-green Airport Energy Component Observation

Variable	Fulfillment	
	Available	Unavailable
The effort to save energy	✓	
The alternative energy used such as Bio		✓
The alternative energy used such as vegetable oil		✓
The use of alternative energy solar	✓	
The use of the Building Automatic System (BAS)	✓	
Total	3 point (60%)	2 point (40%)

Source: primary data 2021

Based on table 1.2 of the energy components referring to the SKEP/124/VI/2009 Eco Airport Guidelines, Ahmad Yani International Airport Semarang has not fully implemented energy management efforts that refer to the application of eco-green airports. It can be seen from the table that 2 standard points have not been fulfilled resulting on a percentage of 60%.

Table 3. Checklist Table for Eco-green Airport Noise Component Observation

Variable	Fulfillment	
	Available	Unavailable
Sound proof building		✓
Noise absrober's plant	✓	
Earth embankment construction	✓	
Plant arrangement	✓	
Provide PPE according to the noise risk level	✓	
Total	4 point (80%)	1 point (10%)

Source: primary data 2021

Based on table 1.3 above, according to the SKEP/124/VI/2009 Eco Airport Guidelines, Ahmad Yani International Airport has not implemented the noise management efforts. It can be seen that 2 standard points have not been fulfilled with a percentage of 60%.

Table 4. Checklist Table for Air Eco-green Airport Component Observation

Variable	Fulfillment	
	Available	Unavailable
The use of rain water	✓	
Water reservoir (pond)	✓	
Management of drainage cleanliness	✓	
WWTP/WTP management	✓	
Maintenance of sanitation channels/MCK	✓	
Water recycle management	✓	
Total	6 point (100%)	-

Source: primary data 2021

Based on table 1.4 of the water component according to the Eco Airport Guidelines SKEP/124/VI/2009, Ahmad Yani International Airport has managed clean water. Observing from the standard points and management point, the percentage is 100%.

Table 5. Checklist Table for Observation of Eco-green Airport Soil Components

Variable	Fulfillment	
	Available	Unavailable
Efforts to clean up the waste without		✓
Used oil reservoir	✓	
Special shelter for B3	✓	
Managing the used oil involves a 3rd party	✓	
Applying 3R principles	✓	
Saving on the paper usage	✓	

	5 point	1 point (16,67%)

Source: primary data 2021

Based on table 1.5 of the soil component according to the Eco Airport Guidelines SKEP/124/VI/2009, Ahmad Yani International Airport has not carried out land management efforts yet that refer to the application of eco-green airport. There is one standard and management point that has not been fulfilled.

Table 6. Checklist Table for Observation of Eco-green Airport Waste Components

Variable	**Fulfillment**	
	Available	**Unavailable**
Temporary waste collection site (TPST)	✓	
Used oil reservoir	✓	
Special shelter for B3	✓	
Managing used oil involves a 3rd party	✓	
Having IPAL	✓	
Routine checks of wastewater quality	✓	
Total	6 point	-

Source: primary data 2021

Based on table 1.6 of the waste components referring to the SKEP/124/VI/2009 Eco Airport Guidelines, Ahmad Yani International Airport has managed waste that refers to the application of eco-green airport. It can be seen that three standard points and two management points were carried out, the percentage is 100%.

Table 7 Checklist Table for Observation of Natural Environment Components of Eco-green Airport

Variable	**Fulfillment**	
	Available	**Unavailable**
Efforts to preserve protected plants	✓	
Efforts to preserve protected animals	✓	
Pest control	✓	
Habitat management study	✓	
Lawn mowing at the airport	✓	
Total	6 point	-

Source: primary data 2021

Based on table 1.7 components of the natural environment which refer to the Eco Airport Guidelines SKEP/124/VI/2009, Ahmad Yani International Airport has managed the natural environment, that is he application of eco-green airport. Observing from the standard and management points carried out by the airport, the percentage is 100%.

Table 8. Checklist Table for Observation of Social, Economic, and Community Health Components of Eco-green Airport

Variable	Fulfillment	
	Available	Unavailable
Controlling the height of plants and growing objects	✓	
Controlling the activities of the surrounding	✓	
Alternative way to the airport	✓	
Community empowerment around the	✓	
Environmental development activities	✓	
Activities to monitor public health around	✓	
Health facilities provided by the airport	✓	
Smoking area provided by the airport	✓	
Controlling the height of plants and growing objects	✓	
Total	8 point	-

Source: primary data 2021

Based on table 1.8 above, in accordance to the SKEP/124/VI/2009 Eco Airport Guidelines, Ahmad Yani International Airport has managed social, economic, and public health which refers to the application of eco-green airport, observing from the standard 8 points with a percentage of 100% completely.

Discussion

1. The Implementation of Eco Airport Air Quality Components

Ahmad Yani International Airport Semarang has managed the air quality by fulfilling three standard points and two policy points with the percentage of 100%. It can be seen from the checklist table that refers to the Guidelines for Implementation of Environmental Friendly Airports (Eco Airport) Number: SKEP/124/VI/2009. It also showed that the airport has managed the air quality, such as airport parks, airport land used for reforestation, tree care that does not invite wildlife, implementing any smoking policy by Semarang City Regional Regulation No. 3 of 2013, and routinely monitors air quality. Based on the results of interviews with resource persons, Ahmad Yani International Airport Semarang has carried out management by the concept of an environmentally friendly airport according to the Environmental Policy of the General Manager. There are no parameters that exceed the quality standard based on Central Java Governor Decree Number 8 of 2021 concerning Ambient Air Quality Standards in Central Java. It was supported by the report document on March 2021 regarding ambient air test, the dust test parameters (TSP), CO, NO2, SO2, O3, Pb, PM10. (Central Java Governor Regulation Number 2 of 2021 concerning Supervision Planning in the Central Java Provincial Government, 2021).

The other air quality management programs were planting trees around the airport and public roads, setting progressive vehicle parking rates, bike to work program, providing smoking areas, monitoring ambient air quality regularly every six months. The airport has carried out the air quality management by the implementation of an eco-green airport. However, based on several sources, the airport has not carried out air quality checks other than temperature and humidity. In addition, regarding indoor air quality checks, it can be carried out to prevent SBS (Sick Building Syndrome) and other respiratory diseases that can reduce the health status of the workforce. (Arjani, 2011)

2. The Implementation of Energy Component Eco Airport

Ahmad Yani International Airport Semarang has not entirely implemented energy management efforts that refer to the eco-green airport. There are 2 out of 5 standard points that have not been fulfilled yet, resulting on having a percentage of 60% from 100%. Based on interviews with Airport Environment Staff, the airport has an energy efficiency policy based on the General Manager's Environmental Policy. Other energy efficiency programs included saving electricity using a motion sensor system/sleep mode in escalators, elevators, and toilets. Ahmad Yani International Airport Semarang has used the Building Automation System (BAS), centralized control and monitoring system to control energy use with a computerized system. (Gagani Chamdareno, Budiyanto and Budi, 2018) The maximum use of natural light so that a minimum of 30% of the floor area used for work gets a minimum light intensity of 300 lux. Moreover, it applied restrictions on operating hours so that the lights and chillers were used when needed. Supported by the results of Roilan's research (2017), the waste of electricity causes inefficient energy use and increases airport costs. Airports must save energy for energy efficiency, form of environmentally friendly activities, and save operational costs.

The energy efficiency management efforts have been conducted by applying the eco-green airport. There are still standard points that have not been fulfilled yet, namely the use of biodiesel or other alternative fuels. However, Ahmad Yani International Airport only uses Semarang with Pertamax and Pertamina Dex for airport operations currently. The biofuels was used in such as FT-SPK and HRJ/HEFA can reduce CO2 emissions and is sustainable. (Lu, 2018)

3. The Implementation of Eco Airport Noise Component

The noise management efforts that refer to the eco-green airport guidelines have not been done. There is one standard point that has not been done of five standard points with a percentage of 80%, namely soundproof building. Based on information from sources, the design of the Ahmad Yani International Airport Semarang has used building materials to withstand the noise. However, it does not affect the noise level in the work environment and surrounding settlements. Based on the interviews, the airport conducted the noise monitoring based on the Regulation of the Minister of Manpower and Transmigration No. 13 of 2011 for measuring the work environment for workers with a maximum quality standard of 85 dBA. In addition, the airport has also provided personal protective equipment (PPE) for officers based on the certain noise level and routinely conducted health tests for workers. (Regulation of the Minister of Manpower and Transmigration of the Republic of Indonesia, 2011) The test results in

residential areas were 48 dBA supported by the document on March 2021 of noise test. It stated that there were still below the quality standard according to the Decree of the State Minister of the Environment No. 48 of 1996 concerning the Noise Level Standard, it is established that the noise quality standard for residential areas is 55 dBA.

The other programs conducted by the airport were reforestation as a green belt or sound barrier, coordination of the Noise Abatement Procedure with AirNav every 6 months, equipment maintenance every 6 months, the maintenance of equipment, and the operational vehicles. Then the airport also measured the noise level based on the WECPL value. There were three levels of the noise area with WECPL, level I, level II, and level III. The noise management efforts carried out by the airport were by the eco-green airport guidelines. There are more standard points that have not been done, such as a special noise-canceling building. However, an alternative made by the airport is that the building was designed to reduce noise. The results supported by Sigit, M. Nawawiy, and Basaria (2017), the selection of the proper building material can withstand and not increase the noise in the airport area. Additional layers such as fiber that can be used as noise absorbers in the noise level III area. (Bachtiar, Afrianita and Zamzamy, 2017)

4. The Implementation of Eco Airport Air Component

The results of observations with a checklist table showed that the airport had made efforts to manage air quality by fulfilling five standard points and one policy point with full percentage of 100%. The fulfilled points such as an effort to utilize rainwater, the airport has rainwater harvesting, and then it is processed with an RO system (reverse osmosis). There are seven water reservoirs or ponds for the water management system to collect water and reduce the risk of flooding. The airport also has a Waste Water Treatment Plant (IPAL), maintains sanitation channels, and manages water circulation or water recycling. From the interview, it is showed that the airport has a water management system, which the largest supply of clean water comes from brackish water and rainwater using an RO system. It was a sustainable saving effort so that it is able to reduce water consumption from PDAM.

The other programs, namely water recycle management, were carried out by recycling wastewater from STP (Sewage Treatment Plant). The maintenance of sanitation and management of drainage hygiene was done to maintain environmental cleanliness. In the clean quality measurement of water document, physical parameters (turbidity, odor, color, etc.) and chemical parameters (Fe, Mn, pH, Zn, and others) were measured in March 2021 as a result of the clean water quality inspection at GWT (groundwater tank) total coliform of 68 CFU/100 ml above the quality standard of 50 CFU/100 ml based on the Regulation of the Minister of Health Number 32 of 2017 concerning Environmental Health Quality Standards and Water Health Requirements for Sanitary Hygiene, Swimming Pools, Solus Per Aqua, and Baths General. (Minister of Health of the Republic of Indonesia, 2017) It could cause various factors such as the quality of raw water sources, operator cleanliness, and equipment cleanliness such as hoses, tubing pipes, and others. As a result, it needs to be examined to minimize the risk of disease caused by water containing total coliforms. (Sekarwati et al., 2016) The programs that have been done by the airport were referred to the eco-green airport. It was necessary to review raw water sources, processing equipment, and storage facilities so that the total coliform in clean water does not exceed the specified quality standard. Because the airport is located

around the sea and swamp, it was necessary to monitor the quality of raw water sources because the acidity of the water around the airport is higher (high CO2 levels).

5. The Implementation of Eco Airport Soil Component

The observations results with a checklist table showed that the airport had not entirely made efforts to manage soil pollution as in the eco-green airport guidelines. There are four standard points and one policy point carried out by the airport with their percentage of 83.33%. Based on the interviews with resource persons, Ahmad Yani International Airport Semarang managed soil pollution in the form of domestic and B3 waste management. Waste management was guided by Law no. 18 of 2008 concerning Waste Management by adjusting the conditions in the field, sorting, collecting, recycling, and transporting waste. (Law of the Republic of Indonesia, 2008) The airport has an Integrated Temporary Storage (TPST) for domestic waste originating from the entire airport area. The garbage from office areas, passenger terminals, parking buildings are transported two times a day, in the afternoon and evening, so that there is no garbage accumulates and pollutes the airport environment. There is a segregated trash can facility consisting of 3 colors with different types of waste, namely plastic, cans, and paper. However, the use of segregated trash bins is not effective because passengers do not dispose the waste based on its type, so it is necessary to re-segregate it at the TPST.

Other programs include saving on the use of paper to reduce waste generation with the help of information technology systems, routine hygiene management, waste sorting, 3R principles, providing B3 waste TPS along the provisions that must be done. Ahmad Yani International Airport Semarang distributed letters to business partners or business partners to reduce the use of plastic once in the airport environment in the form of General Manager letters and official notes. It was done to support the eco-green airport program.

The B3 waste management is guided by the Government Regulation of the Republic of Indonesia No. 22 of 2021 concerning the Implementation of Environmental Protection and Management starting from collection to transportation of B3. (Government Regulation of the Republic of Indonesia, 2021) Currently, the airport B3 waste TPS is still in the process of licensing and improvement. The soil pollution management efforts that have been carried out have been by the application of eco-green airports. There were still standard points that have not been done, namely efforts to clean up waste without chemicals. If there were chemicals that pollute the soil, chemicals could last a long time in the environment because they are difficult to degrade. It can result in the risk of contamination of groundwater. (Fidiastuti et al., 2019).

6. The Implementation of Eco Airport Waste Components

The results with a checklist table showed that the airport had made efforts to manage waste by fulfilling 3 standard points and 2 policy points carried out by the airport, having a percentage of 100%. Ahmad Yani International Airport Semarang has a liquid waste management policy based on the Environmental Policy of the General Manager of AP I.

Based on the interviews with informants, Ahmad Yani International Airport Semarang has an integrated liquid waste management system, namely WWTP (wastewater treatment plant)

consists of 2 STP (Sewage Treatment Plants) and a lavatory for waste from aircraft. Airport waste comes from restaurants, urinals, janitors, ablution facilities, and sinks that will enter the STP. The waste channel was also different. After the STP the wastewater will go to the recycle tank, then there is a channel that will lead to the emergency drain. The airport did not dump waste into the environment because the waste will be channeled into toilets and irrigation. Emergency drain served to accommodate wastewater that processed in times of urgency or excess.

Based on the RKL-RPL Semester I 2020 document owned by the airport, there are parameters that have been met. They are are pH and total coliform which are still above the quality standard based on Minister of Environment and Forestry Regulation No. 68 of 2016 concerning Domestic Waste. (Ministry of Environment and Forestry, 2016) In the July 2020 wastewater test report, in STP one the pH level was unstable at around 4.2 and total coliform was 3500 CFU/100ml, while at STP two the pH level was 4.3 and a total coliform 170 CFU/100ml with a pH quality standard of 6-9 and a total coliform of 3000 CFU/100 ml. It happen due to the airport location that is above a swamp which has a higher degree of acidity. In addition, based on information from sources, the dosing pump located at STP 1, for injecting pH boosters and chlorine, was often damaged, increasing total coliform, and the pH drops. Currently, there is no flow meter, so the wastewater discharge generated is calculated based on the estimated amount of water discharge entering the recycle tank. It also results in the amount of chlorine injection and pH booster being uncertain.

The waste management efforts that were done by the airport have met all standards according to the application of eco-green. The airport has implemented zero waste by minimizing or even eliminating waste that is discharged into the environment. However, there were still wastewater quality parameters that were above the quality standard. Therefore, it needs to be considered because the presence of a high number of coliforms in the water can be the indicator of the occurrence of waterborne disease due to the presence of pathogens. In addition, it can pollute the soil and the surrounding environment. (Sulistiyawati, 2019)

7. The Implementation of Eco Airport Components of the Natural Environment

The results of the checklist table observations showed that the airport had made efforts to manage the natural environment by fulfilling 3 standard points and two policy points carried out by the airport with the percentage of 100%. Based on information from sources, Ahmad Yani International Airport Semarang has managed the natural environment based on the GM AP I Environmental Policy. Semarang Ahmad Yani International Airport Semarang manages risk by creating a Wild Animal Hazard Management Plan to comply with the Regulation of the Minister of Transportation of the Republic of Indonesia Number 83 of 2017 concerning Civil Aviation Safety Regulations (PKPS).

The programs carried out by the airport, namely efforts to preserve protected plants and animals, were contained in the Habitat Management Report document and the Wildlife Hazard Management Plan Document. There is 30% green opened space for plant diversity and provided habitat for various types of animals. Habitat management studies were conducted to identify plants and wildlife around the airport for flight safety. The airport also carried out pest control to create airport security and comfort from pests such as rats, cockroaches, and other

nuisance insects. The airport cooperated with 3rd parties and the supervision of the KKP by using the rat-box, glue trap point, and spraying. Fogging was also carried out outdoor and indoor and also the installation of insect light traps and black holes throughout the airport area. There was a report every week which will be reviewed by the Airport Environment.

Soil pollution management efforts that have been done were by the application of eco-green airports. The efforts made to manage the natural environment to maintain biodiversity, airports manage environmental habitats to meet eco policy aspects, and maintain flight safety from hazards or threats.

8. The Implementation of Eco Airport Social, Economic, and Public Health Components

The results of the checklist table observation showed that the airport had made efforts to manage social, economic, and public health with the fulfillment of eight standard points, having a percentage of 100%. Based on interviews with resource persons, Ahmad Yani International Airport Semarang has made efforts to empower the community by opening job opportunities and opening tenant rentals for business opportunities. The airport carried out a CSR (Corporate Social Responsibility) as a form of responsibility to society or the surrounding environment by carrying out environmental development and community empowerment by opening job opportunities and opening tenant rentals for business opportunities. In addition, daily traffic monitoring is done on the Puri Anjasmara road, data collection for taxis, and airport BRT that can reduce the traffic load on the access road to the airport. CSR was conducted for three reasons, such as a company or agency is part of the community, there needs to be a mutually beneficial relationship between the company and the community, and CSR can be a way to avoid negative perceptions or conflicts with the community. (Nurbaiti and Bambang, 2017).

The social, economic, and public health management efforts that have been conducted are the application of eco-green airports. CSR programs as a form of social and environmental responsibility, monitoring traffic on access roads to the airport, and opportunities to open business need to be maintained to establish harmonious conditions between the airport and the community. It is necessary to conduct periodic health socialization to the community in collaboration with the public health center. The socialization was done to prevent diseases related to operations and others and to fulfill the responsibility of the airport in the surrounding area. (Muhajir Haris and Priyo Purnomo, 2016)

9. Healthy Airport

In the Regulation of the Minister of Health of the Republic of Indonesia Number 44 of 2014, there are five indicators to implement environmental health, 7 points for efforts to organize tools and facilities, and 3 points for efforts to improve clean and healthy living behavior. The assessment became a guideline for conducting a self-assessment so that the airport can evaluate and improve. In the air and land indicators, the airport has conducted the assessment standards. On the other hand, the water and vector indicators have not been done entirely. The arrangements of airport tools and facilities have not been fulfilled yet because there were some limited facilities. As for improving clean and healthy behavior, the airport has done the assessments.

Overall, Ahmad Yani International Airport Semarang has made efforts to create a healthy, safe, and orderly airport. From the health perspective, this minimizes airports becoming a place where the disease commonly spread. The implementation of a healthy airport also supported the concept of an eco-green airport, so that if it goes well, the airport has contributed to realizing the concept.

Conclusion

Ahmad Yani International Airport Semarang has made efforts to manage the environmental components of air, water, waste, the natural environment, social, economic, and public health according to the guidelines for the eco-green airport. The energy, noise, and soil components have not been implemented entirely as environmental management efforts based on standard points.

The suggestions for Ahmad Yani International Airport Semarang is to pay more attention on several points. They are the indoor air quality, the used fuel with biofuel or alternative engine fuels that can reduce CO2 emissions, the use sustainable, and the periodic health socialization to the surrounding community in collaboration with health ccenter. Moreover, it is suggested to pay attention on the interactive media to increase the understanding of users of airport facilities regarding segregated waste bins to support the 3R (Reuse, Reduce, and Recycle) program. For further researchers, it is suggested that they might examine each component of the eco-green airport at airports that have applied the concept, so they will able conduct a more in-depth study related to its operation.

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