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Does Indonesia need water aerodromes? A systematic Study

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ABSTRACT

Indonesia is a large country with an area of 8.3 million KM2, 16,056 islands, and a coastline of 108,000 KM. One hundred seventeen airports have also supported Indonesia. Based on this capital, Indonesia can develop tourism potential with new segmentation while still relying on the maritime and sea sectors. The majority of aviation service users are people who move from one city to another for work or return to their families; meanwhile, other passenger segmentation and potential are still not optimally served, namely tourism, which provides transportation from one tourist attraction to another. Seaplane transportation is needed to support this segmented tourism ecosystem, and a water aerodrome supports it. This research aims to provide an overview of how important the creation of a water aerodrome in Indonesia is in supporting national and exclusive tourism development. This research uses qualitative research methods using secondary data published through articles or reports from authorized institutions. The research mechanism is carried out by identifying the right aircraft and their performance, determining the hub airport as the starting and central point, and then evaluating various factors such as tourist demand, geographical features, and infrastructure to determine which locations are suitable for becoming a resort and building a water aerodrome. The research results show that the Cessna Grand Caravan (C208) is the most popular aircraft for seaplane flights, while there are eight hub airports which are the starting point, and it was found that there are many places that have great potential to build resorts and water aerodrome.

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INTRODUCTION

Indonesia is a vast country. According to national regional reference data for the Republic of Indonesia, Indonesia's territory covers an area of 8,300,000 km^2, with a total water area of 6,400,000 km^2, the coastline is 108,000 km long with a total of 16,056 verified islands (Kementerian Pendidikan, 2018). Based on these data and facts, the transportation sector is a vital sector that must be provided by the country to connect one place to another.

One of the modes used to connect various places and locations in Indonesia is flights. There are 340 airports spread across Indonesia from big cities to remote areas (Dirjen Hubud, 2023). These 340 airports serve passenger and goods flights from and to all corners of the country, even to the interior of Papua or Kalimantan. The distribution of airports by island or archipelago can be seen in Figure 1 below.

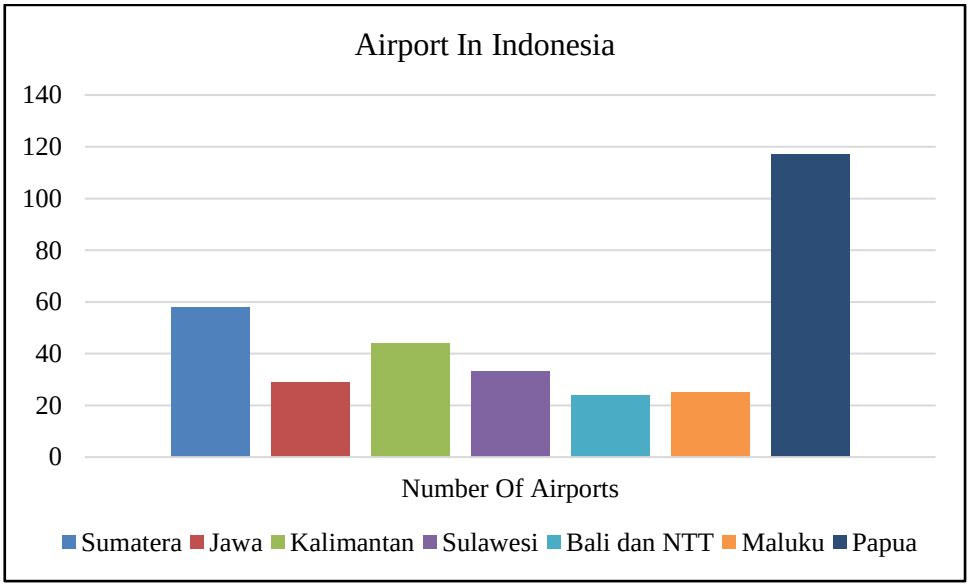

Figure 1. Airport Data in Indonesian Islands.

Papua, the largest island in Indonesia, is ranked first in the number of airports it has with a total of 117 airports and airports, followed by Sumatra Island with 58 airports, and Kalimantan with 44 airports. The airports on these large islands are intended to serve the movement/mobility of people from one area to another within or outside the island. This is following the objectives of the airport as stated in Aviation Law no. 1 of 2009, namely as a transportation network node or opening regional isolation.

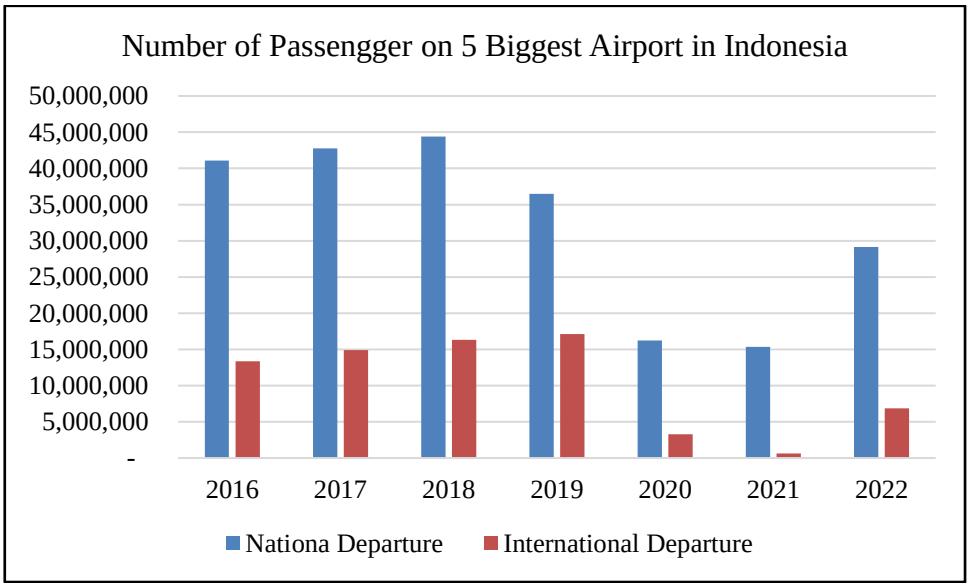

Figure 2. Domestic and international passenger data for 5 main airports.
Source: BPS Statistical Data.

Figure 2. above shows that airline passengers are quite significant, almost reaching 45 million people in 2018 on domestic flights. These passengers are Indonesian people who must be provided with safe and secure flight services. Meanwhile, the total number of airline passengers throughout Indonesia has reached 80 million people. Data on total passenger distribution per province can be seen in Table 1 below.

Table 1
Distribution of airline passengers in Indonesia

Province	Number of passengers of Domestic Flight / Province					
	Arrival			Departure		
	2019	2020	2021	2019	2020	2021
Aceh	412,069	182,752	167,057	423,597	200,733	176,800
North Sumatera	3,292,932	,697,499	1,714,801	3,037,047	1,517,032	1,582,519
West Sumatera	1,356,449	622,526	535,490	1,331,020	581,129	542,865
Riau	1,485,535	704,401	599,455	1,459,090	677,570	606,250
Jambi	747,472	295,451	212,562	740,567	280,952	224,580
South Sumatera	1,964,991	97,376	528,797	1,922,382	700,941	548,052
Bengkulu	382,072	158,894	163,421	393,397	182,137	162,509
Lampung	908,687	247,715	210,860	931,936	322,298	230,152
Kep. Bangka belitung	1,237,728	491,641	458,323	1,201,758	476,909	466,133
Kep. Riau	2,350,059	1,468,100	1,138,413	2,225,107	1,440,754	1,163,897
DKI Jakarta	3,104,091	1,023,137	753,801	2,932,148	979,654	736,105
West Java	1,100,307	252,897	191,675	998,891	246,308	192,871
Center of Java	2,636,125	946,940	657,460	2,609,610	931,432	647,605
DI Yogyakarta	3,354,033	1,205,226	784,392	3,359,644	1,240,239	760,866
East Java	7,712,655	3,379,919	3,002,700	6,902,532	2,958,167	2,587,087
Banten	19,480,251	8,616,161	8,705,037	19,265,062	8,621,796	7,952,582
Bali	4,974,519	1,735,403	1,881,084	4,955,803	1,775,528	1,825,060
West Nusa Tenggara	1,518,158	736,086	618,145	1,424,351	652,582	554,042
East Nusa tenggara	1,854,258	1,056,990	1,059,424	1,749,170	964,074	940,946
West Kalimantan	1,740,039	788,543	583,252	1,742,542	793,534	633,012
Center of Kalimantan	503,147	371,648	321,296	808,205	373,761	337,092
South Kalimantan	1,740,241	784,125	701,201	1,682,185	749,851	651,420
East Kalimantan	3,515,180	1,770,779	1,689,236	2,908,225	1,399,307	1,308,010
North Kalimantan	483,421	237,658	207,009	498,572	245,611	208,648
North Sulawesi	1,002,749	458,689	445,714	998,824	453,934	449,965
Center of Sulawesi	812,115	317,995	314,657	838,307	314,394	305,465
South Sulawesi	5,020,612	2,964,091	3,267,160	3,435,180	1,848,177	1,798,535
South East Sulawesi	802,275	431,794	418,072	810,534	434,641	414,893
Gorontalo	248,108	101,993	87,649	247,443	123,005	91,938
West Sulawesi	63,124	26,641	21,668	67,438	26,976	21,104
Maluku	771,173	383,168	445,628	728,631	348,833	426,077
North Maluku	452,270	206,302	190,336	433,891	198,868	212,993
West Papua	1,101,297	565,182	643,106	1,074,246	569,446	700,335
Papua	1,980,662	837,237	1,276,966	2,019,032	883,168	1,237,515
Total Indonesia	80,108,804	35,164,959	33,995,847	76,156,367	33,513,741	30,697,923

Source: BPS Statistical Data.

The results of research on passengers at Soekarno-Hatta Airport show that 60% of domestic passengers who choose to use air transportation aim to go home or to gather with family, while the most frequent destination province is Bali province (Yarlina et al., 2021).

As mentioned above, airports currently mostly aim to accommodate passenger mobility from one area to another (inland - city or between islands) (Kameswara, 2017; Suhardi et al., 2019). The Indonesian government has provided a maximum and successful role in connecting and uniting the vast nation and state of Indonesia. However, if you look at the existing data, the function of existing airports and flights is only focused on mobility and movement of people and goods from one point to another, with the characteristics of passengers who want to go home or return to their families after a work trip. Current flights do not fully support tourism projections and connect one tourist attraction to another. Currently, only Ngurah Rai International Airport is the main airport priority which mostly serves passengers for tourist purposes.

Currently, the majority of aviation service users are people who move from one city to another for work or return to their families (Yarlina et al., 2021). Meanwhile, other passenger segmentation and potential are still not optimally served, namely tourism which provides transportation from one tourist attraction to another (Arif & Qiram, 2021). The tourism potential of this archipelago is quite large considering the data that Indonesia has 16,056 islands with a coastline of 108,000 KM.

Tourism and resort potential on small islands can be maximized if there is a connecting mode of transportation from a large airport (hub) to tourist attraction locations quickly and directly so you can save time, one of which is by flying seaplane (Arif & Qiram, 2021; Ghifari & Ahyudanari, 2021; Wicaksono et al., 2021). Flight seaplane will save the time needed by tourists to get to their destination tourist attraction or resort (Aditiya et al., 2022; Ispandiari & Fauzi, 2022).

Most tourists, both domestic and foreign, choose Bali as a tourist destination and Ngurah Rai Airport is the main airport serving to and from Bali. In total, in 2019 4.9 million passengers were heading to and departing from Bali. If the tourism potential on the islands around Bali, Lombok, and Nusa Tenggara can be maximized then tourists can reach them by plane. seaplane to save travel time (Arif & Qiram, 2021; Rumani et al., 2023).

To support aviation seaplanes for tourism, it is necessary to build a water airport or water aerodrome. Developing a water aerodrome is not as expensive and difficult as building an airport on land and it is enough to apply for a marine spatial planning permit from the Ministry of Maritime Affairs and Fisheries, an airport permit, and sea operations at the Ministry of Transportation (Rumani et al., 2023). Operation water aerodromes are relatively less complex than airports on land and can even be combined with port operations (Wicaksono et al., 2021, 2022). Indonesia has 2,439 ports whose operations can also be added to water aerodromes (Biro Komunikasi dan Informasi Publik, 2022). If you don't have a port, building a water aerodrome is relatively cheap, because you only need to determine the points that are reference points or each point of the water runway (Wicaksono et al., 2021). So the country no longer needs to build additional, more expensive infrastructure such as airports on land water aerodromes (Rumani et al., 2023). By the explanation above, the research questions were prepared as follows.

RQ 1. What type of aircraft is most suitable for use?

RQ 2. The most suitable location category for flights seaplane to support exclusive tourism?

This research aims to provide an overview of how important manufacturing is in water aerodromes in Indonesia in supporting the development of national tourism and exclusive tourism. This research will also provide an overview of the islands or resorts that can be built with water aerodromes as well as the potential for adequate flight routes connected to existing ports or tourist attractions.

METHOD

This research uses secondary data in the form of data that has been published previously (Hair et al., 2020). The data will be collected, processed, and concluded to build an appropriate thought construction (Siyoto & Sodik, 2015; Timans et al., 2019). This research method uses qualitative methods. The data needed in this research is the movement of tourists in Indonesia, active port data, and distance from the nearest tourist attraction or resort. Because the number of ports in Indonesia reaches 2,439, this research uses several criteria as follows:

1. Aircraft configuration and range seaplane (airplane reference seaplane commercial in Indonesia).
2. Areas most frequently visited by tourists (as hub airports).
3. The distance the plane can travel by seaplane according to configuration calculations.
4. Look for tourist locations/resorts that are within a radius of the airport hub.
5. Focusing on island areas that have become tourist attractions (there are already resorts).

6. There is already a port (if possible).

Calculations of aircraft configuration and distance traveled are used to map areas/islands or tourist attractions that can be reached by aircraft seaplane from the hub airport. After knowing the data and seaplane configurations that are most widely used by commercial airlines, we need data on tourists who travel to Indonesia. This data is used to map the areas most frequently visited by tourists. Once the data is known, mapping of the areas/tourist objects/resorts developed around the main tourist visiting areas is carried out and if possible there is a port. The mapping mechanism uses the Google Earth application with the help of the KML Generator to carry out the plotting. The concept of thinking in this research can be seen in Figure 3 below.

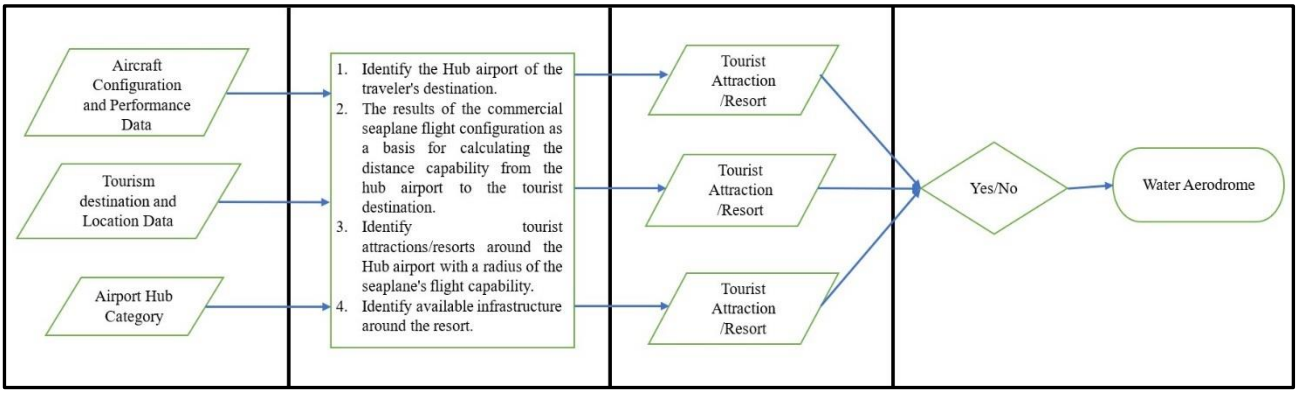

Figure 3. Thinking Framework
Source: Researcher Data

Result and Discussion

1. Identify Aircraft seaplane and the performance

In Indonesia, several airlines operate seaplane flights. Some of them are charter flights, and others are operations general aviation (OC 91). From the data received, for seaplane flights, airlines more often use the Grand Caravan (C 208) aircraft belonging to the Cessna manufacturer (Arif et al., 2021).

Table 2. Data on seaplane airlines and the types of aircraft used.

Aircraft	Air Operator		
	Travira Air	Airfast Indonesia	Mission Aviation Fellowship (MAF)
Cessna C208 Grand Caravan	2		2
Twin Otter DHC 6-300		2	
Kodiak 100			1
Aviation Permit	AOC 135	AOC 135	OC 91

Source: Arief et al (2021).

Based on Figure 4, there are 4 planes recorded seaplane from a Cessna Caravan operating in Indonesian airspace. Two aircraft are operated by Travira Air and the rest are operated by Mission Aviation Fellowship (MAF). Based on this data, in this research, the Cessna Grand Caravan (C208) was determined as the main aircraft for the flight seaplane in Indonesia. After this, it must be calculated performance and endurance from the plane. Calculation data performance aircraft as follows:

a. Looking for fuel capacity

Fuel Capacity:
Total Capacity ..... : 335.6U.S.Gallons
Total Capacity Each Tank ..... : 167.8U.S.Gallons
Total Usable ..... : 332.0U.S.Gallons
(Source POH 208)

Conversion:
Fuel Capacity:
Total Capacity ..... : 1275.28 Litres
Total Capacity Each Tank ..... : 637.64 Litres

Total Usable ..... : 1261.6 Litres

.....Avgas Density = 0.72 Kg/l..... .....

The maximum capacity of the C208 Grand Caravan is
Total Capacity ..... : 918.2 Kgs
Total Capacity Each Tank ..... : 459.1 Kgs
Total Usable ..... : 908,3 Kgs
Empty Weight ..... : 5585 Pounds = 2.533 Kgs
MTOW ..... : 8750 Pounds = 3.969 Kgs
Allowed Traffic Load ..... : 3165 Pounds = 1.436 Kgs

Assume Passenger Weight 14 Adult @ 70 Kgs : 980 Kgs
Allowed Bag @6.5 Kg ..... : 90 Kgs
Payload ..... : 1070 Kgs

Payload Formula

……Payload = Zero Fuel Weight – Dry Operating Weight……..

Estimate Take-Off Weight
RTOW ..... **:** 3.969 Kgs
Basic Empty Weight ..... : 2.533 Kgs
Max Fuel Carry ..... : 1009 Kgs
Payload ..... : 1070 Kgs
Total Traffic Load ..... : 4.612 Kgs
Fuel Decrease ..... : - 643 Kgs
Allowed Fuel ..... : 366 Kgs
ETOW ..... : 3.969 Kgs

Flight At 8000 FL
Time ..... : 7 Minutes
Fuel ..... : 49 Lbs = 108 Kgs
Distance ..... : 14 NM
KIAS ..... : 115
TAS ..... : 2% 115 8000/1000 + 115
: 2,3 . 8 + 115
: 133 Kt
Assumed Cruise at 1900 RPM
TAS ..... : 183 Kt

Assumed Descent Below 16.000 Ft
TAS ..... : 160 kt
Average Speed on the 3 steps (Climb, Cruise n Descent) refer to POH C208 Grand Caravan
TAS ..... : 158 kt

b. Calculating Cessna Grand Caravan C208 Endurance

Endurance : 366 / 141 * 60
Time Endurance : 155 Minutes = 2 Hours and 35 minutes

Endurance Formula

.....Endurance = $\frac{Block\ Fuel}{Fuel\ Consumption\ per\ Hour}$ x 60’ .....

c. Total mileage

Total mileage (d) = $(\frac{True\ Air\ Speed}{60'})$ x time
= $(\frac{158\ Knot}{60'})$ x 155 minutes
= 408 NM

The total distance traveled by the Cessna Grand Caravan (C208) when full of passengers and fuel is 408 NM, including flights to alternative airports. However, because there may not be a process refueling at the destination water resort or airport, the distance of 408 NM must be divided by 2 for the return flight process, in other words, the total distance is around 204 NM. On VFR flights (the option selected is visual flight rules) there is a formula for calculating the amount of fuel needed in a flight, namely:

.....fuel VFR= Fly to destination + Fly to alternate airport + 30 Minutes.....

Source: CASR Part 91

So, before determining which tourist attraction and/or resort you can go to, first determine the hub airport and alternative airports.

2. Hub airport as the main aviation node seaplane

Determining a hub airport that can be used as the main node for seaplane flights must meet several conditions, one of which is an airport that is often used as an entry point (arrival) for tourists both from within and outside the country and there are also airports nearby that can be alternative.

Table 3. Number of visitors/tourists for each province and resort potential

Province	Visits per Year	Potential tourist attractions and resorts
Aceh	7,989,477	X
North Sumatera	27,006,445	X
West Sumatera	14,771,986	X
Riau	10,782,083	√
Jambi	4,582,629	X
South Sumatera	10,574,598	X
Bengkulu	2,502,836	X
Lampung	13,461,095	X
Kep. Bangka belitung	2,179,148	X
Kep. Riau	2,212,232	X
DKI Jakarta	61,237,700	X
West Java	152,510,552	X
Center of Java	117,335,456	X
DI Yogyakarta	30,761,919	X
East Java	207,813,619	X
Banten	43,129,799	X
Bali	20,672,537	√
West Nusa Tenggara	13,274,308	X
East Nusa tenggara	4,795,981	√
West Kalimantan	4,359,110	X
Center of Kalimantan	3,470,037	X
South Kalimantan	6,705,075	X
East Kalimantan	7,388,614	X
North Kalimantan	532,791	X

Province	Visits per Year	Potential tourist attractions and resorts
North Sulawesi	5,145,398	X
Center of Sulawesi	5,911,627	√
South Sulawesi	23,913,021	√
South East Sulawesi	11,173,548	X
Gorontalo	1,710,997	X
West Sulawesi	3,509,810	X
Maluku	852,721	√
North Maluku	1,649,077	√
West Papua	602,494	√
Papua	1,278,581	X

Source: BPS Indonesia

Based on the location of the islands, the number of tourist attractions visited is as shown in table 2 and 3, So it can be concluded that the hub airport is the center for flight departures seaplane are:

a. Ngurah Rai International Airport, Bali;
b. Komodo Airport, NTT;
c. Sultan Hasanuddin Airport, Makasar;
d. Syukuran Aminudin Amir Airport, Luwuk;
e. Sam Ratulangi Airport, Manado;
f. Sultan Babullah Airport, Ternate;
g. Pattimura Airport, Ambon; And
h. Dominique Eduard Osok Airport, Sorong.

This is the primary data for finding locations where water airports (water aerodromes) could be built. After the location of the hub airport has been determined, the next step is to identify the flight range with the endurance of the Cessna 208 Grand Caravan aircraft. The previous calculation results showed that the Cessna C208 Grand Caravan aircraft could cover a distance of 408 NM, assuming this included round-trip flights, alternative airports, and fuel reserves for VFR logging.

Based on the airport, which has become the central hub for seaplane flights, in-depth checks can be carried out regarding the location within a predetermined radius according to the aircraft's performance (Cessna Grand Caravan C208). Based on the calculations above regarding the performance of the Cessna Grand Caravan, it is calculated that the aircraft's capability/range is 408 NM. If during the flight it is not possible to refuel at the destination airport, then the furthest distance traveled, including calculations to the alternative airport, and also an additional 30 minutes for VFR, then the furthest radius from the hub airport is 100 NM and that a distance is a safe distance which is the flight radius centered on the hub airport.

The depiction of the location and radius of the area uses the KML application by entering the coordinates of the hub airport as the center of the circle and a radius of 100 NM from the center of the circle so that it will be seen which areas will be covered within a radius of 100 NM and then the identification of resorts that meet and are suitable for building a water airport and seaplane flights. The plotting mechanism uses a web-based Google Earth application with the help of a KML generator to produce radius circles for each hub airport. The hub airport is the center of the circle because the hub airport is the central place for flight operations, including maintenance, refueling, and loading and unloading of passengers and goods.

Based on the location and radius that have been determined, we can plot any locations that are possible to build and develop resorts with the support of water airports whose investment value is much smaller than conventional airports and also support from airlines to develop seaplane flights that can reach resorts from hub airports. The location map of the water airport can be seen on figure 4.

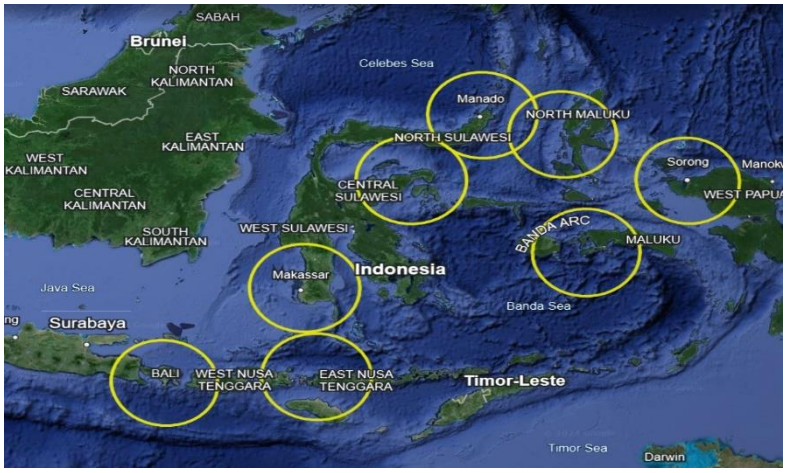

Figure 4. Hub airports and potential locations for water aerodrome.

Based on the plotting data, it can be seen that potential resorts that can be developed include a group of islands in the southwest of Lombok Island, a group of Komodo islands, and other islands in East Nusa Tenggara, along the coast on the west or east side of South Sulawesi Province, a group of islands in the north or south of Luwuk Regency, a group of islands in North Sulawesi Province, a group of islands around North Maluku and Maluku Provinces, as well as the well-known group of islands in West Papua including Raja Ampat District. This is only based on the radius and distance from the airport hub, which has many potential resorts and tourist attractions to promote, as we mention first the method and no more.

Tourism can only be enjoyed directly, while tourist attractions in Indonesia are spread across beautiful islands, so adequate transportation is needed so that tourists can reach these tourist attractions. Flights and airports are central nodes connecting one region to another, containing tourist destinations (Bhuiyan et al., 2021; Choudhury & Dixit, 2019). The Ministry of Tourism and Creative Economy has determined five priority tourist destinations: Borobudur, Lake Toba, Likupang, and Mandalika. These priority destinations must be supported by the availability and reliability of transportation to provide services to visitors to reach these tourist attractions easily, quickly, and, if possible, affordably. It should be noted that 4 of the five priority tourist destinations have water tourism destinations. Indonesia has many beautiful small islands that have not been fully explored as new tourist destinations. So in this study, we propose the concept of ideas and concepts about the development of integrated flights using a seaplane fleet by increasing the number of water aerodrome points (locations) (Wang et al., 2023)

Why seaplane and why water airport? This is because of the geographical conditions of the Indonesian region which consists of many waters (seas), and there are a total of 16,671 islands, almost all of which have beautiful coastlines. Indeed, not all water conditions can be used as landing locations for seaplane flights, but in this vast area of Indonesia, there will be many island points that are tourist attractions that can be landed by seaplane flights (Guo et al., 2021). The following are well-managed resorts that are likely to be able to land seaplane flights.

Seaplane flights in Indonesia have strengthened again with the seaplane flight campaign carried out by the Government, in this case, the Ministry of Transportation. The Indonesian Aviation Academy Banyuwangi immediately responded with the existence of an amphibious seaplane training aircraft and also built a water airport in Banyuwangi's Pang-Pang Bay (Wicaksono et al., 2021). Seaplane flights can be alternative transportation in remote and coastal areas without building expensive infrastructure (Prayitno et al., 2022; Rumani et al., 2023). However, just as the Maldives are rich because they sell exotic tourism services, Indonesia can also sell the same tourism and is no less than the Maldives by building seaplane flight infrastructure (Rumani et al., 2023).

The Cessna Grand Caravan aircraft was chosen; apart from being used by many airlines in Indonesia, since the beginning of production, the Cessna Grand Caravan has also been the choice for modifying seaplanes. (Arif & Qiram, 2021; Cessna Introduction Mode 208B; Wicaksono et al., 2021). Meanwhile, when selecting a hub airport, one must consider commercial factors, including tourism potential and the number of tourist visitors. Seaplane transportation offers tourism potential with a different segmentation (high-end) (Shabrina et al., 2023; Sung et al., 2024). This seaplane transportation can develop tourism with resorts on remote islands with stunning natural beauty.

Water aerodrome can also be placed around the port so that it is easier to supervise and inspect passengers and aircraft crew to continue to carry out the airport's role, thus strengthening the nation's insight

and sovereignty of the archipelago. Water airports can also be developed at points or locations near resorts or tourist attractions that facilitate access from the city (main airport) to the resort or tourist attraction. Based on the figures and nominals paid to finance the construction of airports or Conventional Ports, the figures/nominals can be used to build 10 thousand water airports along with the training of technical personnel (water aerodrome operators), which until now can still be accommodated with three core personnel, there are communication officers, Fire Fighter and Aviation Security.

In the process of supporting a high-class tourism ecosystem and seaplane transportation, it is necessary to facilitate the construction of a water airport, which at least involves the Ministry of Transportation regarding technical matters and the Ministry of Maritime Affairs regarding marine space (Ison, 2024; Rumani et al., 2023). This ease of licensing will invite investors to develop tourism (resorts) and, at the same time, build a water airport(Andrade et al., 2023; Dewantoro et al., 2024; Tong et al., 2023). At the same time, other investors will come to provide seaplane transportation services (Shabrina et al., 2023). Water airports can be built around existing resorts or ports without expensive additional infrastructure (Rumani et al., 2023; Wicaksono et al., 2021). The tourism ecosystem and seaplane flights have run well in the Maldives (Nizar, 2013; Sung et al., 2024).

Developing the seaplane aviation sector requires various parties, including the public and private sectors (Riyadi et al., 2024; Xiao et al., 2020). Currently, luxury tourism development has occurred in many countries that offer luxury, beauty, and comfort (Gao et al., 2021; Sung et al., 2024). Indonesia has many locations for this development. Even some places in Indonesia are protected by calm waves because they are in a group of islands (Guo et al., 2021). The development of water airports is the primary fundamental in seaplane flights (Syafiq et al., 2020). Amphibious aircraft can maneuver both on land and in water. However, the development of resorts requires good cost efficiency, and using water airports is the best choice for supporting the resort's development.

Based on the research results above, it is known that six hub airport locations have been determined based on data on tourist visits and also the potential for resort development, ports, and alternative airports. The six hub airports will become seaplane transportation nodes, and from a predetermined radius (100 NM / 182 KM), water airports can be built according to needs. Apart from pioneering transportation and especially for high-end tourism potential, this water airport can also be used as a location for aviation-based sports, inviting tourists to come (Kos et al., 2019). So, it can segment tourism potential, and at the same time, a water airport (water aerodrome) can be built for pioneering flights.

CONCLUSION

Developing segmented tourism potential is easier by building an effective and efficient aviation ecosystem, one of which is using aviation seaplanes. Seaplane flights, especially amphibious, are cheaper because they use an existing airport as a hub while building a new water airport does not require expensive costs to build infrastructure. The construction of a water airport only ensures that a reference point for the airport (reference point or runway point) must be established, which can be placed in a port or location around the resort. The research shows that the Cessna 208 Grand Caravan is the most suitable aircraft for becoming an amphibious seaplane aircraft, which can fly away 408 NM or 2 hours and 35 Minutes flight. We found that eight airports can be hubs for seaplane operations to deliver to the most potential resorts or tourist attractions that must be promoted worldwide. A water aerodrome can be built near the resort with less financial, or we can use the available infrastructure like a seaport. A seaplane is one of the potential options to promote Indonesian tourism to the world, and because of that, we need to build a very cheap water aerodrome instead of an aerodrome on land at a very high cost.

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