Development of Aerotropolis in Kulon Progo with Green Infrastructure Concept

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Abstract. This study aims to analyze the development of Aerotropolis in the Yogyakarta region with a development concept that prioritizes green development values. Aerotropolis is a multi-purpose development where the airport serves as a focal point and is surrounded by multi-purpose business districts and transportation systems. An airport in an area will almost certainly spur the development of the following industries: warehousing, real estate, aircraft repair shops, tourism and restaurants. This research is qualitative research using secondary data, namely: national, regional and district government documents in the form of the Basic Medium- and Long-Term Development Articles of Association and Regional Spatial Planning Plans. The results show that: the Aerotropolis development concept in Jogjakarta will have a good impact on the regional and national economy. This can be confirmed by the faster and easier movement of the economy between regions and countries. Also, the concept of Aerotropolis development in Jogja is carried out by paying attention to environmental, agricultural aspects and strengthening green infrastructure concepts.

1. Introduction
On 29 March 2020, Yogyakarta International Airport officially operates [1]. Yogyakarta International Airport, located in Temen District, Kulon Progo Regency, is expected to boost the economy in Kulon Progo and the Special Region of Yogyakarta, fostering the investment climate; spurring the growth of MSMEs; encourage tourism [2]. In the regional regulation of the Special Region of Yogyakarta, number 5 of 2019 concerning the Spatial Plan for the Special Region of Yogyakarta for 2019-2039, the development of the Temen-Prambanan area is projected to become one of the province's strategic areas in terms of economic interests. One of the manifestations is the development of an aerotropolis area. Aerotropolis can increase economic growth in a country or a region [3]. Aerotropolis is an urban area where the airport is the center and is supported by business centers such as the delivery of goods; aircraft maintenance; express courier and warehousing) and oriented to the local community around the airport [4][5][6]. Many examples of countries that have successfully implemented aerotropolis include Amsterdam Airport Schipol in the Netherlands; Piedmont Triad International Airport in the United States; Incheon International Airport in South Korea's New Songdo City; Shenzhen in China; and Dubai Airport in Dubai[7]. These countries have succeeded in developing airport cities supported by several integrated facilities such as airport trains, warehousing business centers, residential areas, health facilities and tourism objects around...
the airport [8]. These countries have also succeeded in developing aerotropolis areas while maintaining environmental sustainability [9]. This was tried to be adopted by the Special Region of Yogyakarta. Infrastructure development is significant for the community both economically and socially [10]. Since the President's Council on Sustainable Development discussed the concept with academics, most of whom came from the UK, Western European countries and North America in the 1990s, they have tried to fight for green infrastructure planning [11]. Green infrastructure is an area arrangement that connects urban and rural areas while preserving the value and function of natural ecosystems, which also contributes to sustainable natural resource management and can benefit human populations [12][13]. Green infrastructure plans apply fundamental principles of landscape ecology to urban environments, in particular: a multi-scale approach with explicit attention to patterns: process relationships, and an emphasis on connectivity [14]. Apart from preserving nature and the environment, green infrastructure also has several other benefits: Public health, economic growth and attracting investors.

Yogyakarta International Airport, which is located in the temon sub-district, Kulon Progo district, has an agricultural land area of 11,047 hectares and as many as 81,435 residents of Kulon Progo Regency work in the agriculture, forestry, hunting and fisheries sectors [15]. This is a challenge in itself for the government of the Special Region of Yogyakarta in developing the Aerotropolis while maintaining the existing local culture. The three topics are sustainable development, implementation policy, and urban planning.

2. Methods
This research uses qualitative methods through literature reviews from various literature. The literature review can find out of distance or different findings that can be known in advance. In qualitative research, it is emphasized that this research must have its closeness. The analysis gets a clear understanding of reality and the objective conditions [16]. The data used in assessing the development of the aerotropolis area in Kulon Progo is secondary data are taken from official government documents in-laws, regional regulations, governor regulations and regent regulations.

3. Finding and discussion
3.1. Aerotropolis Yogyakarta International Airport
Since they are closely linked to highlight about multi scalar relation, the consequences of aerotropolis from YIA creation become debates in sustainability science. The propensity of Indonesia's national government to develop economic growth-based regulations reflects the link between urban political ecology and larger scale political economy as the fundamental character of nature-society relations in this case[17]. Unfortunately, if aerotropolis growth continues, water shortages and shoreline changes are likely to occur on a smaller scale. These negative consequences are accompanied by the suffering of local people who are pushed off their land with no recourse. In sustainability science, the complexity of socio-ecological relationships can lead to various dilemmas and conflicts of interest in societies [18][19]. On the one hand, the government of Indonesia's neoliberal policies, which include participation in broader communication networks and the introduction of PPP mechanisms, seem rational because the country lacks export activities that can help boost economic development. Moreover, Indonesia lacks adequate funding to invest in infrastructure development, which has become a critical factor in fostering economic growth[20].

According to the order, YIA was established to promote Yogyakarta as the economic hub of the Java corridor. It is clear from this order that YIA production is meant to promote industries and services. As a result, Yogyakarta has gained a reputation as a cloth, furniture, and leather exporter. These three products are mostly sold in the United States and Europe. In terms of local-to-global relations, the aerotropolis would most likely aid in the promotion of Yogyakarta's main commodities' export activity so that they can be exchanged on the global market. In line with this, the service sector, which includes tourism, has added to
the Special Region of Yogyakarta's income for a long time [21]. Again, aerotropolis is likely to attract more visitors as well as more investors to fund this sector by investing in hotels and restaurants. The decision of the Indonesian government could potentially help some citizens who can keep up with the pace of urbanization by getting enough capital to start investing in land that is becoming more costly over time. They may also expect a higher economic return in the future because aerotropolis can serve as a global business entry point. On the other hand, many displaced people are still waiting for Angkasa Pura to provide them with a decent employment. Furthermore, many others are already struggling to rebuild their lives from the ground up, with greater challenges in maintaining their status as farmers, and many more will be displaced as a result of aerotropolis growth.

The unequal return from the case of urbanization, which is driven by the aerotropolis of YIA growth, shows that there is a trade-off between the three pillars of sustainability: economy, climate, and social. In the one side, efforts to change the economy on a broader scale result in significant local effects on social and environmental issues on the other. In light of this, the presence of sustainable development goals (SDG) is critical for achieving a balance between the economy, the environment, and social progress. This case exemplifies the significance of SDG 11, which focuses on sustainable cities and communities. SDG 11 encourages national and regional development planning to reflect positive economic, social, and environmental relationships in urban practice. It also encourages people from all walks of life to engage in urban planning [22]. Furthermore, SDG 10 on reducing inequality is a critical path for the case of YIA's aerotropolis because it ensures that people have a proportionate chance of achieving equality by enhancing fairness through applicable policies and regulations [23].

Source : www.jogjainvest.jogjaprov.go.id

Figure 1. Master plan of Aerotropolis Yogyakarta International Airport
3.2. Implementation Policy of development Aerotropolis Yogyakarta International Airport

Airport city is the core of the formation of Aerotropolis, a newly developing independent city with an airport as its center [24]. The existence of the airport will automatically grow various types of businesses. The emergence of these various types of businesses will impact the economic development of the area around the airport [25][26]. This was tried to be adopted by the Government of the Special Region of Yogyakarta to improve the people's welfare in the Kulon Progo Regency and avoid the emergence of slum areas in Yogyakarta International Airport.

Figure 1 shows the master plan of aerotropolis Yogyakarta International Airport.

With the construction of Yogyakarta International Airport in Temon District, Kulon Progo Regency in line with the speech of Sri Sultan Hamengku Buwono X, the Governor of Istimewa Yogyakarta, in a special plenary session at the DIY DPRD after being appointed as Governor of the Special Region of Yogyakarta for the 2017-2022 period with the theme "Welcoming the Century Indian Ocean for the Glory of Human Dignity in Jogja" (Kompas. id 2017). This is then outlined in the Yogyakarta Special Region Government Regulation Number 3 of 2018 concerning the Regional Middle Development Plan (RPJMD) for the Special Region of Yogyakarta as the vision, mission and direction of development of the Special Region of Yogyakarta in 2017-2022, one of which is "Yogyakarta will act actively fill out the agreements that have been made by the Government of Indonesia in the Framework Agreement of the IORA (Indian Ocean Rim Association), to develop the Southern Yogyakarta Region solely to increase the dignity of Jogja's people as a whole, both those living in the Southern Region and those living in Yogyakarta. Other areas throughout Yogyakarta. Increasing the dignity of the people of Jogja includes the definition of improving the quality of life of a socially just and civilized society." [27].

Aerotropolis development does not always get support from the community, the main problem. Problems such as unsynchronized development policies between the central government, local governments and PT. Angkasa Pura, I, land use, air pollution are essential problems of Aerotropolis development [24][28]. Previous research has examined how there are changes in community land from the construction of an airport [6][30]. To realize an aerotropolis that is economically efficient, aesthetically balanced, and socially and environmentally sustainable, it is necessary to synchronize policies between the central government, provincial governments, and district governments.

In the concept of regional autonomy, spatial planning falls under the authority of the regional government. However, in order to prevent gaps between regions, Law number 26 of 2007 concerning Spatial Planning was enacted. The law regulates area development that must be carried out by the provincial government to the village government. Law Number 26 of 2007 concerning Spatial Planning also regulates that developments carried out by the central government, regional governments and village governments must still pay attention to the sustainability of natural ecosystems in development areas. Table 1 shows several articles from Law Number 23 of 2007 concerning Spatial Planning which regulates spatial planning based on environmental sustainability.

| Article 17 |
|---|
| (1) The contents of the spatial plan include spatial structure and spatial pattern plans. |
| (2) Spatial structure plan referred to in (1) is a central settlement system plan and infrastructure network system plan. |
| (3) Spatial pattern plan referred to in (1) includes the designation of protected areas and cultivation areas. |
| (4) The designation of protected areas and cultivation areas as referred to in paragraph (3) includes spatial designation for environmental, social, cultural, |
economic, defense and security conservation activities.

(5) In the framework of environmental preservation as referred to in paragraph (4), in the regional spatial planning arrangement a forest area is stipulated at least 30 (thirty) percent of the area of the river basin.

(6) The spatial planning arrangement must take into account the inter-regional linkages, inter-regional functions and inter-regional activities.

(7) Further provisions regarding the procedures for the preparation of spatial planning related to the defense and security functions as a regional spatial planning subsystem shall be regulated in a government regulation.

| Article 28 | The provisions for district spatial planning as referred to in Article 25, Article 26, and Article 27 apply mutatis mutandis to urban spatial planning, provided that other than the details in Article 26 paragraph (1) are added:
| a. plan for the provision and utilization of green open space;
| b. plan for the provision and utilization of open non-green space; and
| a. c. plans for the provision and utilization of infrastructure and facilities for pedestrian networks, public transportation, informal sector activities, and disaster evacuation spaces, which are required to carry out the function of urban areas as centers of socio-economic services and centers of regional growth.

| Article 29 | (1) Green open space as referred to in Article 28 letter a consists of public green open space and private green open space.
| (2) The proportion of green open space in the city area is at least 30 (thirty) percent of the total area of the city.
| (3) The proportion of public green open space in the city area is at least 20 (twenty) percent of the total area of the city.

| Article 30 | The distribution of public green open space as referred to in Article 29 paragraph (1) and paragraph (3) shall be adjusted to the distribution of population and service hierarchy by taking into account the spatial structure plan and pattern.

| Article 31 | Further provisions regarding the provision and utilization of green open space and non-green open space as referred to in Article 28 letter a and letter b shall be regulated by a Ministerial Regulation.

The construction of the aerotropolis in Yogyakarta did not immediately get a good response from the local community. The construction of Yogyakarta International Airport has faced opposition from several community groups because it is built on agricultural land, where agriculture is one of the main livelihoods of the community (Edita 2019). Table 2 below shows the area of rice fields by sub-district in Kulon Progo district.

| No | Subdistrict | Total of Rice Field Area (Ha) |
|----|-------------|------------------------------|
| 1. | Temon       | 1.236                        |
| 2. | Wates       | 1.094                        |
| 3. | Panjatan    | 1.242                        |
| 4. | Galur       | 1.178                        |
| 5. | Lendah      | 735                          |

Table 2. Area of rice fields by sub-district in Kulon Progo Regency
6. Sentolo 1,318
7. Pengasih 750
8. Kokap 109
9. Girimulyo 560
10. Nanggulan 1,392
11. Kalibawang 789
12. Samigaluh 644

Source: BPS, Kulon Progo dalam angka 2021

Temon sub-district, where the location of Yogyakarta International Airport is the fourth sub-district with the largest rice field area owned. In the construction of the Yogyakarta International Airport Aerotropolis area. The Yogyakarta Special Region Government has prepared two areas for aerotropolis development with an area of 1,000 hectares as a core area and 6,000 as a buffer zone. The development of the aerotropolis area in Yogyakarta does not only focus on cities but on agriculture which will be supported for the international market [31]. In the Governor Regulation of the Special Region of Yogyakarta in 2018 concerning the 2017-2022 Middle-Term Development Plan for the Special Region of Yogyakarta, in the spatial pattern plan there is a cultivation area plan. In the plan for the cultivation area, there is an area designated for agriculture. There are three directions of spatial use / program indication, namely: maintaining the area of wetland agricultural areas, maintaining dry land agricultural areas and improving infrastructure and supporting facilities.

4. Conclusion
Aerotropolis is one model that is being widely used by developing countries in the development of urban areas with an airport as the center. The concept of aerotropolis was first put forward by Professor Kasarda, with the understanding that an airport will lead to the growth of new businesses with a radius of 30km from the airport gate. These businesses are something that is very dependent on the existence of airports. These businesses include: residential areas, warehouses, shopping centers, aircraft workshops, warehousing to integrated public transportation modes such as trains.

The construction of aerotropolis is a matter of debate in the community, including in Yogyakarta. Those who do not agree say that the construction of aerotropolis will only destroy community agricultural lands which will result in the local community losing their livelihoods. The noise and the potential for the emergence of new industries in the aerotropolis area are one of the reasons for certain groups because it will reduce clean air in the area around the airport.

The Special Region of Yogyakarta is a special region with the passing of Law No. 13 of 2012 concerning the Privileges of DIY. One of its affairs is culture. In the concept of runag arrangement and human development in the Special Region of Yogyakarta the philosophy of "Hamemayu Hayuning Bawana". This concept existed long before the concept of green infrastructure existed. In the RPJMD document, the RTRW of DIY province and RPJMD of Kulon Progo district, the development of aerotropolis areas does not only focus on cities, but also maintains agricultural lands and will be used as natural tourist destinations in Kulon Progo and spatial planning patterns as aerotropolis support areas.

Alignment of the master plan and the Detailed Spatial Plan for the Aerotropolis area in Kulon Progo with the aim of spatial planning in DIY needs to be done to create a new urban area around Yogyakarta International Airport that is environmentally friendly and can provide benefits to the people around the area. So that the main objective of developing the aerotropolis area in order to improve the welfare of the community in Kulon Progo Regency can be achieved.
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