Review Article

From Runway to Cityscape: Challenges of Airport-Driven Urban Growth

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Abstract

Incorporating airports into urban growth and economic development has greatly altered the geography and economics of cities. This study compares the conventional airports with the new model of the "Aerotropolis," focusing on their dual functional nature as the points of entry and departure and growth drivers. It reviews the effects of airport growth on urban land use, the real estate market, and other economic sectors. The study uses examples from Schiphol Airport in the Netherlands and Dallas-Ft. Worth Airport in the United States. The analysis identifies the potential and challenges of the Aerotropolis approach as well as concerns on sustainability, equity, and the coherency of economic development with planning. It is recommended that to ensure effective economic development, there is a need to enhance governance, involve stakeholders and effectively manage land use to ensure that economic development is sustainable and beneficial to the environment and the people affected. This paper finds that airports can have a great impact on today's urban and economic environments and highlights the need for a proactive and sustainable approach to the development of airport-related projects.

Keywords: Airport city, Aerotropolis, Airport-driven development, Economic development, Airport development area

1. Introduction

The development of air transportation technology has made travel more convenient and faster, with costs trending downward compared to the past. The increased volume of travel and transport passing through airports worldwide has made air transportation a crucial driver of economic growth, significantly contributing to the development and expansion of the modern economy. This is propelled by the fusion of digitalization, globalization, aviation, and time-based competition, creating a new economic geography with airports as the central hub for transportation and urban economic development.

Airports play a vital role in driving and shaping land use patterns and urban development around their vicinity (Appold, 2013; Flores-Fillol et al., 2016; Kasarda, 2000, 2009, 2010, 2013; Kasarda & Appold, 2006). They serve as critical centers connecting travel and transport between cities, regions, and countries and as significant mechanisms supporting and linking critical economic activities in national and international markets. This has led to global trade, investment, tourism, and travel amidst other essential

economic activities. Therefore, investing in public projects to develop airports can significantly support urban economic development, promoting growth by creating jobs and attracting new businesses around airports. This requires proper land use planning. However, some airports lack adequate planning for surrounding area development, leaving large tracts of land reserved for development vacant and neglected. Conversely, other rapidly growing airports experience saturation and congestion around them. Hence, airport area development can impact urban growth in both scenarios (Weisbrod et al., 1993).

The important issue is the number of considerations that have to be made. Since, airport is one of the most important facilities that have great impact on the economy of region, it can affect on employment, investments and the infrastructure. The transformation from the legacy airports to the new generation airports such as airport cities and aerotropolises also reshapes urban geography, affecting land use, commercial real estate, and the spatial distribution of industries. Global case studies, such as Schiphol (Netherlands) and Las Colinas (Dallas-Fort Worth), illustrate successful integrations of airports within urban ecosystems, providing insights into best practices and challenges. It is important to find the right balance between economic growth and environmental and social responsibilities, considering challenges like traffic jams, scarce land, and environmental issues. Also, the flexibility of the aerotropolis concept is essential as it has to be designed in a way that would suit the region in question with the help of governance, infrastructure, and market factors. Finally, airports change the urban form and this has implications on housing, transportation and commerce.

The study has been undertaken to establish the effect of airports on the use of land and economic growth in the regions surrounding the airport development projects. Also, the research will present and discourse the major gaps and challenges of airport-driven developments from the case studies of airport-driven developments within the urban planning framework and major lessons learned.

2. From Airport City to Aviation Hub City

Historically, the development of airports and surrounding areas has followed the "Airport City" model, where airports are typically located in large urban areas. The term "city" here reflects a diversity of interrelated land uses (Poungias, 2009), which involves clusters of economic activities linked to the airport alongside various business and commercial activities in the airport's vicinity (Guller & Guller, 2003).

Building on this discussion of airport cities, the scale of commercial land development is influenced by several factors, such as air connectivity, regional economic potential, the commercial orientation of airport operators, and support from both the public and private sectors. Airport City development generally follows four primary directions: (1) clustering of retail stores in terminal buildings, (2) commercial office spaces, (3) air freight facilities, and (4) spaces for tourism, leisure, and health amenities. The importance of each of these directions varies based on market opportunities. This market-driven concept was adopted by Amsterdam Airport in the 1980s, generating additional revenue from diverse retail offerings in terminal stores and increasing income from airport taxes and parking fees. This approach has since expanded to become a vision for other airports, such as Brisbane Airport (Timbrell et al., 2006).

In the past, Airport City development typically occurred within the airport's boundaries, using designated zones, generally located near major airports, for continuous structure and land use development. This promoted a variety of commercial and service sectors to support businesses, services, and amenities associated with air travel, as well as trade and logistics. Historically, airports were viewed as places for travel featuring airplanes, runways, control towers, passenger terminals, hangars, and other facilities that provided direct services for aircraft, passengers, and goods. This traditional understanding led to limited focus on the development of airports or their surrounding areas.

Kasarda (2001) introduced the 'Aerotropolis' or 'Aviation Hub City,' a model that has gained significant attention among scholars, governments, and private-sector agencies (Figure 1). The Aerotropolis concept builds on the Airport City model by integrating aviation-related activities with diverse urban functions, such as commerce, logistics, and residential development. It does not solely emphasize transforming airports into aviation service centers but also focuses on creating business networks and areas linked to airports. These areas support future development near airports or significant aviation hubs, usually located near airports, and integrate aviation-related activities with other businesses such as hotels, wholesale, logistics services, and tourism. These businesses are economically significant due to the airport's vital role as a primary location for air cargo handling and travel.

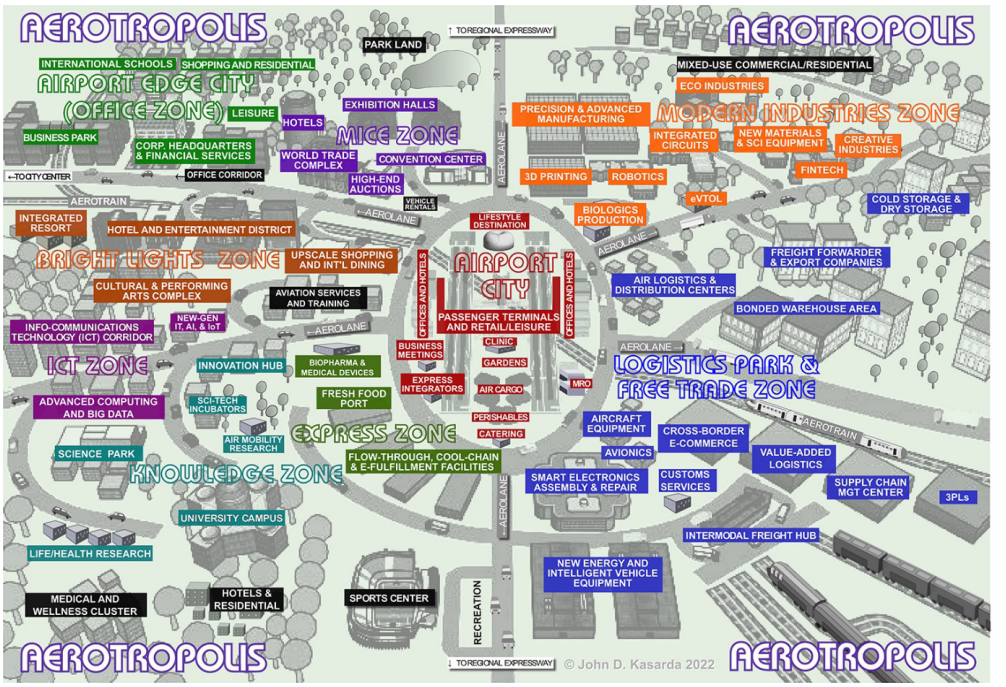

Figure 1. Aerotropolis Concept
Source: https://airport-world.com/aerotropolis-4-0

The Aerotropolis is an innovative city model that leverages an airport's potential and integrates air transportation with other modes of transportation to facilitate fast connections between high-value businesses, emphasizing the importance of time in transportation and distribution. The critical components of the Aerotropolis model consist of a commercial center with the airport as its core, functioning similarly to a city's Central Business District (CBD). Surrounding areas adjacent to the airport or major roads are allocated for industries, warehouses, logistics centers, and distribution hubs related to air transport, such as medical products, pharmaceuticals, and perishable goods.

Further out is the commercial area, developed to accommodate mixed-use spaces with commercial, service, and residential areas to meet the needs of travelers frequently passing through the airport. This includes shops, restaurants, shopping malls, entertainment venues, hotels, leisure facilities, exhibition centers, and office buildings. These economic activities benefit from their proximity to the airport and the interconnectivity among business sectors reliant on air transportation (Kasarda, 2016).

Residential zones are positioned further away to support the workforce employed within the airport and nearby. The surrounding radius of the airport area is encompassed by a transportation network that links to other economic activities, enabling convenient and swift access to business interactions.

The main road leading to the airport, known as the "Airport Corridor," is a link between the airport and the city center, serving as a channel for road and rail infrastructure that connects with real estate development. This corridor concept aims to transform the area into an integrated economic zone. The significance of this corridor is driven by factors such as airport size and geographic coverage, transportation connectivity with various areas, available land, airport or city leadership (or collaboration), local economic structures, institutional establishment, and development vision. Clearly defined corridors are found most prominently in cities with large airports close to the city center, with specific governance structures and extensive public investment in infrastructure, as seen in Kuala Lumpur, Singapore, and Hong Kong (Schaafsma, 2008).

The growth of the airport area depends on several factors, including (1) companies providing air transportation services, (2) companies regularly utilizing air transport, (3) businesses meeting the needs of air travelers and employees of the companies as mentioned earlier, and (4) companies needing regional highway access. These factors shape land use direction, closely tied to the influence of the airport on local activities. Given the rising significance of air transportation and airport cities, urban planners must focus on strategic land use planning within airport zones, ensuring proper policy preparation for successful aviation hub development. Several airports worldwide have been developed as aviation hubs, including those in Hong Kong, Incheon, Kuala Lumpur, and Dubai (Kasarda, 2000).

3. The Influence of Airports on Urban Economic

Development and Land Use Patterns Airports shape urban economies through global competition, rapid mobility, and enhanced connectivity. The concentration of airport-related activities catalyzes economic growth by attracting industries that depend on swift logistics and efficient supply chains, prompting businesses - particularly those in time-sensitive industries such as pharmaceuticals, high-tech manufacturing, and perishable - to locate near airports (Freestone, 2009; Kasarda & Appold, 2006).

3.1 Impacts on Land Use

Effective zoning strategies are key to maximizing the benefits of aerotropolis projects. Research has identified various factors influencing economic activity near airports, such as land availability, logistical connectivity, and access to infrastructure, all of which make these locations attractive to diverse business sectors (Green, 2012; Weisbrod et al., 1993).

Business activities around airports generally fall into two categories: new activities attracted to the area and expansions of existing urban businesses. Newly introduced activities are often located near airports due to their logistical advantages, contributing to regional economic growth and creating employment in industries like regional headquarters, international trade hubs, and aviation-related services. The airport's influence often transcends its immediate boundaries, affecting metropolitan economic activities by attracting businesses that leverage global connectivity for their operations (Appold, 2013; Graham & Guyer, 2000).

Additionally, urban expansion around airports fosters business clusters, often termed airport cities, where diverse economic sectors flourish, including hospitality, technology, warehousing, and logistics. For instance, the areas around Los Angeles International Airport and Atlanta International Airport are home to numerous hotels, offering proximity for business travelers and airport personnel, thereby adding substantial value to local economies through increased visitor spending and employment opportunities (Bowen, 2008; Kasarda & Appold, 2006).

The clustering effect is prominent within a 10-mile radius around airports, where industries like manufacturing, air freight, and warehousing converge. Industrial clusters around major airports, such as those seen at Madrid-Barajas Airport and Koln-Bonn Airport, underscore the economic potential of these hubs. Flores-Fillol and Nicolini (2006) illustrate that over 450,000 square meters of commercial and industrial space were developed around Koln-Bonn Airport, indicating a robust response from industries reliant on air transport.

3.2 Impacts on Economic Development

Airports contribute to immediate local economic activities and play a pivotal role in regional economic growth. Effective airport infrastructure development requires comprehensive planning, encompassing spatial, temporal, and economic considerations to maximize its benefits. However, the extent to which airport projects succeed in fostering sustainable economic growth depends on factors such as project scale, design, and the quality of planning, as demonstrated in studies on U.S. airports (Windle & Dresner, 1995).

According to Postorino (2010), airport economic impacts are typically classified into four categories:

- **Primary Effects:** These occur during construction, where infrastructure such as runways, terminals, and maintenance facilities generate short-term employment, often involving substantial investment in labor and materials.
- **Secondary Effects:** Post-construction airports enhance economic development by creating direct employment opportunities in passenger and cargo services, contributing to local economic resilience and income generation.
- **Tertiary Effects:** Secondary businesses—such as retail, hospitality, and entertainment—thrive due to proximity to airport hubs, creating an ecosystem that supports and benefits from the movement of people and goods. By reducing travel costs and providing localized services, airports foster a positive economic cycle, encouraging customer spending in the vicinity and supporting regional businesses.

• **Perpetuity Effects:** Airports catalyze long-term shifts in regional economic structures, stimulating industry changes such as shifts from agriculture to tourism or the growth of high-tech manufacturing sectors. This impact is seen around major airports like Dulles International in Washington and Logan International in Boston, where airport-centered growth has diversified regional economies and attracted investment in technology and services (Button et al., 2010; Postorino, 2010).

These impacts reflect the airport's potential as a business magnet, creating significant employment and fostering economic diversification. For example, Dallas-Fort Worth International Airport and Dulles International Airport each generate hundreds of thousands of jobs within a 2.5-mile radius, underscoring the airport's potential as an economic engine akin to urban central business districts (Brueckner, 2003; Kasarda & Appold, 2006). According to Table 1, the comparative table presented highlights changes in the number of jobs within a 2.5-mile radius of five major aerotropolis projects before and after development. The selected airports include Chicago O'Hare International (USA), Dallas/ Fort Worth (USA), Washington Dulles (USA), Paris Charles de Gaulle (France), and Amsterdam Schiphol (Netherlands) (Figure 2).

Figure 2. Development around 5 airports

Table 1. The comparative table of the changing number of jobs within a 2.5-mile radius of five major aerotropolis projects

Airport	Job Before Development	Year (Before)	Job After Development	Year (After)	Change	Percentage Change
Chicago O'Hare	300,000	1995	450,000	2010	+150,000	+50%
Dallas/Ft.Worth	250,000	1990	395,000	2008	+145,000	+58%
Washington Dulles	150,000	2000	240,000	2015	+90,000	+60%
Paris Charles Gaulle	180,000	1998	250,000	2014	+70,000	+39%
Amsterdam Schiphol	500 Firms	1992	1,000 Firms	2012	+500 Firms	+100%

Source: Annual economic impact report of each airport, and Karsada (2009, 2011)

In case of Chicago O'Hare International Airport (USA), prior to the aerotropolis development around 1995, employment within a 2.5-mile radius was approximately 300,000 jobs. By 2010, this figure grew to 450,000 jobs, reflecting a 50% increase. This growth can be attributed to strategic expansion projects, including logistics hubs, commercial business zones, and improved transportation links, which attracted firms and created new employment opportunities. For Dallas/Fort Worth International Airport (USA), the employment base around Dallas/Fort Worth International stood at 250,000 jobs in 1990. Following aerotropolis-oriented developments completed around 2008, the number of jobs increased to 395,000 jobs, representing a 58% of employment growth.

The development of logistics and distribution centers and adjacent commercial facilities contributed to this surge, enhancing the airport's role as a key transportation and business hub in the central United States. Similarly, employment near Washington Dulles International Airport increased from 150,000 jobs in 2000 to 240,000 jobs by 2015, an increase of 60%. The aerotropolis strategy focused on attracting technology firms, government contractors, and logistics companies. Moreover, employment within a 2.5-mile radius of Paris Charles de Gaulle International Airport increased from 180,000 jobs in 1998 to 250,000 jobs by 2014, marking a 39% increase. The aerotropolis development surrounding this airport included extensive infrastructure upgrades, commercial zones, and the establishment of business parks.

The concentration of logistics firms and multinational companies enhanced the airport's role as an economic engine in the Paris region. Finally, Amsterdam Schiphol International Airport experienced remarkable growth in business density, with the number of firms increasing from 500 firms in 1992 to 1,000 firms by 2012. This 100% growth reflects the success of Schiphol's aerotropolis model, which integrates business headquarters, logistics centers, and advanced infrastructure. The airport's strategic location and connectivity made it an attractive hub for multinational corporations and financial institutions.

The table clearly demonstrates that aerotropolis development leads to substantial employment growth in regions immediately surrounding major airports. The observed increases, ranging from 39% to 100%, highlight the transformative potential of aerotropolis strategies. These projects create a synergistic relationship between aviation infrastructure and economic activities, fostering job creation across various sectors, including logistics, technology, finance, and retail.

4. Challenges of Airport-driven Development

The concept of an "Aviation Hub City" is a widely recognized model for urban development in the 21st century. This approach involves the development of airports and surrounding areas, with the airport functioning as the core of the city's economic zone and as a central hub for diverse activities. Beyond serving as a transit point for passengers and goods, it becomes a significant center for business and other ventures, such as hotels, conference centers, manufacturing industries, and other facilities requiring connectivity with air transport.

However, the Aviation Hub City concept presents challenges for many countries striving to make this development model successful. Misinterpretations and misunderstandings of the concept often hinder its implementation. The term "aerotropolis" is sometimes used interchangeably with other airport-centered development terms like "airport city," "sky city," and "airport metropolis." Often, the concept is presented primarily through the work of John Kasarda, limiting perspectives to specific dimensions. Hirsh (2017) highlights that the aerotropolis model may not achieve success in all airport contexts, as some airports face high vacancy rates in office spaces and underperforming logistics centers. This raises the question of how urban planners can make the aerotropolis model successful in aligning airport development with 21st-century economic growth.

One of the unsuccessful cases is the Berlin Brandenburg Airport (BER) in Germany, which was mentioned by Hirsh (2017). He described the BER as not a classic aerotropolis in the same vein as some mega-projects; it is emblematic of how poor planning and execution can derail an airport-centric urban development initiative. Hirsh (2017) explained that the failure of the Berlin Brandenburg Airport (BER) can be attributed to a combination of project mismanagement, technical flaws, and strategic shortcomings. Poor coordination, frequent leadership changes, and unclear communication among multiple contractors led to significant delays and budget overruns, escalating the cost from €2.5 billion to €7 billion. Serious construction issues, particularly with the complex fire safety system, repeatedly failed inspections and stalled progress. These delays undermined public confidence and deterred investment in surrounding infrastructure and ancillary businesses essential for a successful aerotropolis. When BER finally opened in 2020, its design was already outdated, unable to meet passenger demand or incorporate modern airport technology, further limiting its potential as an airport-driven economic hub. As a consequence, the delays and failures of the Berlin Brandenburg Airport (BER) resulted in substantial economic losses for the region, hindering potential growth and causing missed opportunities for regional development. The repeated postponements also stalled the planned aerotropolis model, preventing the establishment of business parks, logistics centers, and commercial hubs around the airport. This lack of timely infrastructure development discouraged investors and impeded the creation of a thriving airport-driven economic ecosystem, ultimately limiting the airport's potential to act as a catalyst for regional prosperity.

4.1 Urban Planning and Economic Development Challenges

One challenge of the aerotropolis model is that airports may lack the attraction needed to encourage businesses and residents from outside the area to relocate nearby. Most people still prefer to live and work in established city centers due to the amenities, convenience, and transportation networks available there. Additionally, logistics centers, warehouses, and distribution hubs often seek locations with low transportation and land costs to maximize profitability. As a result, while logistics facilities are commonly located near airports to minimize transport costs, the higher land costs in these areas mean that relatively few companies choose to establish operations directly around airports.

Despite these challenges, some airports have successfully adopted the aerotropolis model, such as Schiphol International Airport in the Netherlands and the Las Colinas Community near Dallas-Fort Worth International Airport. Success in these cases may not stem from direct airport impact on nearby development, but rather from locations strategically positioned between dense urban centers and the airport itself.

Aerotropolis development may not be suitable for all airports, depending on various internal and external factors that impact surrounding areas, such as governance and policy frameworks. Effective governance is crucial for aerotropolis success, as governments often play a key role in developing the infrastructure connecting airports to surrounding urban areas, including road, rail, and utility networks. For example, Singapore's Changi Airport benefits from government policies that align national development goals with urban planning, integrating the aerotropolis model into Singapore's economic strategy. Conversely, airports in regions with fragmented governance may struggle to align policies across multiple sectors, complicating the vision of a unified aerotropolis (Oster & Strong, 2001).

Community involvement is also essential, as local communities are vital stakeholders directly affected by airport development and expansion. Aerotropolis projects may face community opposition without local support, limiting social acceptance and growth. Transparent planning, community engagement, and participatory development can help ensure that aerotropolis benefits reach local residents through job creation, affordable housing, and quality infrastructure. Hirsh (2017) emphasizes that effective community involvement can drive aerotropolis success, achieving economic and social objectives.

4.2 Environmental and Social Sustainability Challenges

While the paper thoroughly explores the economic and urban growth spurred by airport development, the environmental and social sustainability challenges of such expansions are not sufficiently addressed. These challenges are crucial to achieving balanced and responsible development, particularly as airports continue to expand in response to global travel demands.

In term of the environmental challenges, Airports are one of the important sources of GHG emissions because of air traffic, ground handling and related logistics activities. With the increase in air traffic, there is an increase in carbon emissions that in turn contributes to climate change. According to Freestone (2009), the environmental impact of airport expansion is that it

leads to increased fuel consumption and CO_2 emissions from both the aircraft and the infrastructure. In addition, Postorino and Versaci (2014) pointed out that such effects can be reduced by the application of green technologies and sustainable practices. Besides the carbon emissions, airports are also one of the main contributors to air pollution and noise pollution in the form of aircraft emissions, vehicle emissions and industrial activities. This deterioration of the air quality is a serious health concern to people who live in the surrounding areas (Green, 2012). Moreover, noise pollution from takeoffs, landings and ground operations can also have a negative impact on residents' quality of life through sleep deprivation and other health issues. Some of the effective measures include the establishment of noise abatement zones and enhanced aircraft technology; however, these have not been well enforced. Another significant issue is the effect on land use and ecosystems since the development of new airports involves acquiring large pieces of land.

According to Flores-Fillol et al. (2016), faulty land use planning results in habitat destruction, loss of biodiversity and increased surface runoff which causes flooding and destruction of the environment. In order to tackle these environmental issues there is a need for planning of airports and their infrastructure and effective and proper execution of measures that help in development of airports and at the same time safeguard the environment and the people.

For social challenges, the discussion of paper indictes that airport expansions can result in resettlement of locals especially in highly populated areas. Weisbrod et al. (1993) pointed out that airport expansion and related development leads to resettlement of people, often times forcefully and with little or no compensation and assistance. This displacement affects social bonds, threatens well established communities and has a greater impact on social groups which may have a difficulty in finding new homes. However, there are other issues that are also important and these include the social equity and inclusion of airport development. Freestone and Baker (2011) stated that not all members of the community are able to enjoy the advantages that come with airport growth and development especially where the planning and involvement of the community is concerned is concerned. Thus, without such measures, airport expansions can perpetuate the existing inequalities, thus excluding the needy. Therefore, it is imperative that the jobs, infrastructure, and economic growth associated with airport projects touch the lives of the people in the vicinity. This calls for the involvement of all stakeholders and the government in ensuring that development projects benefit all individuals and not just business or external investors. Thus, solving these social problems, airport-oriented urban development can create more homogeneous and, consequently, more durable urban environments.

5. Conclusion and Recommendations

The "Aerotropolis" or "Aviation-Centric City" concept extends beyond the airport's traditional role of transporting passengers and cargo; it is a central hub that significantly drives economic growth in surrounding areas. The Aerotropolis creates an environment that supports businesses and industries reliant on rapid transport, such as hotels, conference centers, manufacturing industries, and logistics centers, which are vital in bolstering local and national economies. The development of an Aerotropolis requires comprehensive land-use planning to ensure that the airport's surrounding area can accommodate diverse developments, including business, commercial, residential, and other necessary facilities. In practice, the challenges of developing an Aerotropolis arise from a lack of modern infrastructure and misunderstandings of this concept, which can limit the efficient use of available resources. Additionally, adapting the concept to fit local contexts is essential, requiring consideration of the local community's needs.

Furthermore, successful Aerotropolis development necessitates government support in land management policies and comprehensive infrastructure development, including roads, railways, and utilities, to effectively connect the areas around the airport. Collaboration with the private sector is crucial to attract investment, potentially through zoning plans for economic areas like hotels, shopping centers, and residential spaces. Thus, developing a successful Aerotropolis requires adaptable strategic planning that can adapt to market and economic shifts. Community involvement is also crucial for gaining local acceptance and support, ensuring that development benefits are distributed to the community in ways that enhance the quality of life, including job creation, modern infrastructure, and sustainable local economic growth.

According to the challenges of the airport-driven development, urban planners should adopt a comprehensive and inclusive approach that balances economic growth with sustainability and equity which means urban planners need to employ a systematic and holistic approach that would enable them to promote growth while ensuring sustainability and equity. The following recommendations outline key strategies for achieving this balance:

1. Integrate Comprehensive Environmental Impact Assessments (EIAs): the Environmental Impact Assessments (EIAs) should be made a requirement by urban planners before the development. Gas of Emissions and air pollution should be evaluated. Since the airport expansion will increase air traffic, logistics, and ground operations (Freestone, 2009). Sustainable infrastructure is another assessment that should be considered for airport development projects. The implementation of green technologies should be considered to provide for terminal buildings, and the use of sustainable aviation fuels such as SAFs to minimize carbon footprint (Postorino & Versaci, 2014). Also, Biodiversity Protection should be included to avoid or minimize habitat loss and protect the existing habitat with green corridors, and wildlife-friendly landscaping (Flores-Fillol et al., 2016). In terms of noise and air pollution control, regulated noise abatement zones should be provided by setting barriers to minimize noise pollution in nearby homes (Green, 2012).

2. Adopt Inclusive Land Use Planning: planners must make sure that the land use policies are put in place to accommodate the expansion of the airport. Zoning regulations should be provided to avoid mockery of haphazard growth, protection of green areas and control of urban sprawl around airports. Mixed-Use Development should be considered t[support the concept of inclusive development which involves the integration of both commercial, residential and recreational developments in the same area while ensuring that there is adequate provision of green spaces.

3. Promote Equitable Community Involvement Hence: planning processes must involve the community as the target for developing an airport. Effective strategies include participatory planning, which should get involved in the urban planning processes with the community members for the decision-making process in the initial stages through consultations, workshops, and public hearings to identify their needs and feelings (Freestone & Baker, 2011). Fair compensation and support should be offered to the affected community from airport development to help move and provide affordable housing for people who were forced to leave their homes (Weisbrod et al., 1993).

4. Social Equity and Inclusion: one practical approach is to mitigate social inequality by prioritizing employment opportunities for local residents through job creation initiatives. These initiatives should include vocational training and skill development programs to help local populations gain the qualifications necessary for jobs related to airport operations, logistics, hospitality, and other associated industries. In addition to employment, significant investments in local infrastructure are crucial to enhancing the quality of life for communities near airports. This includes developing and improving schools, healthcare facilities, and public transportation networks to ensure that essential services are accessible and that mobility within the community is facilitated. Moreover, addressing the need for affordable housing is critical to preventing the displacement of lower-income groups. Ensuring that new housing developments around airports include affordable options can help maintain social cohesion and provide equitable living conditions. As noted by Freestone and Baker (2011), without these measures, airport-driven growth risks exacerbating existing social inequalities. By integrating job creation, infrastructure development, and affordable housing into airport planning, urban growth can be inclusive, benefiting all community members and promoting long-term social sustainability.

Declaration of Generative AI and AI-assisted technologies in the writing process Statement: During the preparation of this work the authors used ChatGPT V4o and Grammarly exclusively to improve readability and language. However, this only impacted a small portion of the text. After using this tool, the author reviewed and edited the content as needed and take full responsibility for the content of the publication.

CRediT Authorship Contribution Statement

Chakarin Bejrananda: conceptualization, formal analysis, writing - original draft, writing – review and editing, conceptualization, writing – review and editing.

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