



COMPONENTS OF AN AEROTROPOLIS

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DOI: <http://doi.org/10.47211/idcij.2025.v12i02.009>

ABSTRACT

The rapid growth of the aviation industry in the 21st century has positioned airports as more than just transit points — they have become key drivers of urban and regional development. In India, increasing airport footfall reflects a city's growth in tourism, employment, hospitality, and commerce. This shift marks the rise of the aerotropolis — a city model cantered around an airport that integrates hospitality, retail, business hubs, convention centres, and entertainment zones to create an interconnected and self-sustaining urban environment. Examples of this emerging model can be seen in cities like Delhi and Bangalore, where large areas surrounding their international airports have been developed into vibrant urban nodes. Around 250 acres near IGI Airport in Delhi and 530 acres around Kempegowda International Airport in Bangalore have been transformed into mixed-use districts featuring world-class infrastructure, hotels, business parks, and lifestyle amenities. These aerotropolis aim to provide not just convenience, but a holistic experience of living, working, and leisure — fostering socio-economic development while redefining the role of airports as the core of future cities.

This study through a comparative case study approach identifies the various components of an aerotropolis.

Keywords: Aerotropolis, Airport, Airport city, components, development.

ABOUT AUTHORS:



Ar. Mahima Kapur is an expert Architect and Urban Planner with over 4 years of experience in the design practice and 1 year academic realms. Holding a Master's degree in Urban Planning from Guru Nanak Dev University, Amritsar, with currently serving as Assistant Professor in Guru Nanak Dev University, Amritsar, Ar. Mahima is passionate about shaping young minds to face the needs and challenges of the profession. Alongside being a diligent professional with a portfolio that spans residential and commercial projects she is also a dedicated educator, who strives to inculcate technical proficiency in students, empowering them to become diligent professionals shaping the future of architecture.



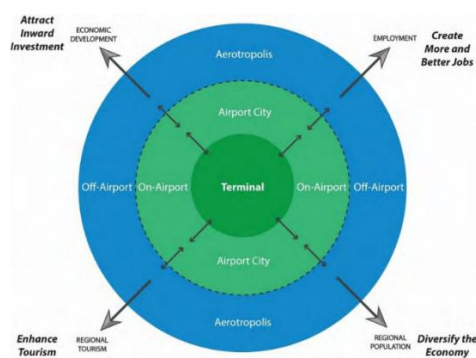
Ar. Shaheen Sobti is an accomplished Architect and Urban Planner with over 10 years of experience in the design practice and 8 years academic realms. Holding a Master's degree in Architecture and Urban Planning from School of Planning and Architecture, New Delhi, she has dedicated her career to exploring sustainable urban design solutions, with a particular focus on climate-responsive and zero emission architecture design and planning. Currently serving as Assistant Professor in Guru Nanak Dev University, Amritsar, Ar. Shaheen is passionate about shaping the next generation of architects and planners through innovative teaching methods that blend theoretical knowledge with practical design challenges. Alongside being a diligent professional with a portfolio that spans residential, commercial, and urban-scale projects she is also a dedicated educator, who believes in fostering critical thinking and creative problem-solving in students, empowering them to design spaces that address both current and future challenges.

INTRODUCTION

An aerotropolis is an urban region whose infrastructure, land-use, and economy are centered on an airport. This framework includes a set of concentric rings of specific activities around the airport, starting with an inner zone of distribution centres, logistics complexes, and just-in-time manufacturers, then a ring of office parks, hotels, restaurants, and convention centres, and then still farther out a largely residential periphery home to those who make their livelihood in the aerotropolis (MXD Development Strategists / Stantec, 2015). Airport Authority of India -The Airports Authority of India, or AAI, is a public sector enterprise under the ownership of the Ministry of Civil Aviation, Government of India. It is responsible for creating, upgrading, maintaining, and managing civil aviation infrastructure in India (Airport authority of India, 2022).

AEROTROPOLIS CONCEPT

In the Aerotropolis concept, a core "Airport City" area on and adjacent to the airport brings together aviation and air cargo-focused businesses, along with retail, office, accommodation, educational, recreational, and business amenities in a dynamic hub of activity (MXD Development Strategists / Stantec, 2015). (Refer figure 1 and 2)



Source- <https://aerotropolis.com>

Figure 1- Objectives of growth of Aerotropolis

Figure 1.3 Aerotropolis Pyramid

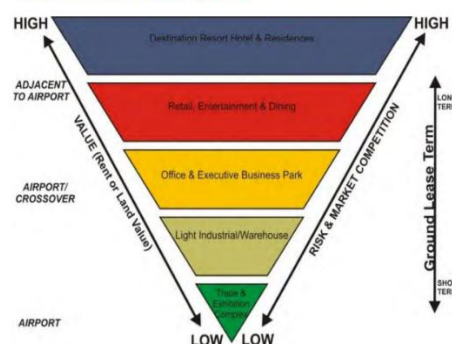


Figure 2- Aerotropolis pyramid showing the land and rent values

AIRPORT AND ITS TYPES

An airport consists of a landing area, which comprises an aerially accessible open space including at least one operationally active surface such as runway for a plane to take off or a helipad, and often includes adjacent utility buildings such as control towers, hangars and terminals. (Federal Aviation Administration, 2022).

Types of Airports

Types of Airports are as follows-

- 1.International Airport-** An international airport is an airport that offers customs and immigration facilities for passengers arriving from other countries. International airports are typically larger than domestic airports and often feature longer runways and facilities to accommodate the heavier aircraft. Some, such as Frankfurt Airport in Germany are very large; others such as Fa'a'a International Airport in Tahiti, are quite small (Federal Aviation Administration, 2022).
- 2.Domestic Airport-** A domestic airport is an airport that handles only domestic flights-flights within the same country. Domestic airports do not have customs and immigration facilities and so cannot handle flights to or from a foreign airport
- 3.Private Airport-** A private airport is any airport that is not open to the public. Private airports can also be airports that are owned and operated by private individuals and are not open to anyone then those who own it.
- 4.Defense Airport-** A defence airport is that airport that is not open to the public and handled Indian armed force flights (MXD Development Strategists / Stantec, 2015).

COMPONENTS OF VARIOUS AEROTROPOLIS INTERNATIONAL CASE STUDIES

1. Incheon International Airport

One of the most ambitious airport city and aerotropolis of today of area 15000 acres is being developed at South Korea's Incheon International Airport. At the core of the aerotropolis is Air City, a set of multimodal mixed-use complex is being developed consisting of retail and commercial areas, business parks, high end office buildings, logistics, ICT functional spaces, recreational and leisure activities, exhibition center and conference halls, high tech assembly halls as well as new mixed use residentially dominant towns. All these major facilities are further connected to the main city through public transport (A high speed commuter rail line) as well as expressways for private transport connectivity (Michael Chen, 2020).

The airport area of Incheon is approximately 15,000 acres which is considerably larger than most of the airport areas in Asia. Its new master plan has mixed use development evolving through three phases. The first phase which is already developed consisted of Airport Support Community which included aviation related industries, commercial and business services, as well as permanent and temporary housing for employees working at the airport. The second phase focuses on expanding this airport support community into an International Business Hub of about 360 acres comprising of four office complex structures, exhibition and expo facility and international level hotels. The third and the most ambitious stage is a complete aerotropolis which will be integrated with an extended International Free Enterprise Zone (IFEZ). The IFEZ is being developed and promoted as a "Pentaport" (Refer map-1) – A combination of seaport, airport, teleport, leisure port and business port (Michael Chen, 2020).



**The Incheon Aerotropolis-An exemplar of 21st century airport centric
Map 1-Layout of Incheon Airport city**

1.1 Components within the Airport

The Incheon Airport consists of the following components as below-

- 1) Restaurants and bars
- 2) Shops & Duty Free
- 3) Currency Exchange
- 4) ATMs, Tax Refund
- 5) Information Desks
- 6) Hotel Reservations
- 7) Tour Information Center (Dept. of Global Studies & Geography, Hofstra University, New York, USA, 1998-2023).

1.2 Components surrounding the airport

The Incheon Airport consists of the following components as below-

- 1) A 360-acre international business center composed of four office complexes, a shopping mall, convention and exhibition facility and two five-star hotels.
- 2) 220-acre commercial project under development is the Airport Free Zone (Michael Chen, 2020).

2. Schiphol International Airport

Schiphol ranked to be the 14th busiest airport in the world; it is one of the most important European airports. It is also ranked 16th busiest in terms of cargo tonnage and at the same time 6th busiest in terms of international passenger traffic. The facilities and services at Amsterdam Schiphol International Airport are considered to be finest in Europe with wide range of commercial services like restaurants, shops and bars, as well as leisure and tourism activities and so on. The Airport's shopping center stocks a wide range of world class brands, which provides a wide range of choices to the travellers at reduced cost due to duty free shops making it to develop in the area of 6887 acres . The airport at the same time is very well served in terms of transportation infrastructure (International Journal of Scientific & Engineering Research Volume 9, Issue 11,, 2011).

The train station located underneath the airport; have trains going directly to the city centre as well as the other parts of the city. Along with that, there are direct international trains, the one going to Brussels as well as Paris which stops at the airport station providing the commuters easy access to many cities around. (Dept. of Global Studies & Geography, Hofstra University, New York, USA, 1998-2023).

The development has led to creating of new employment opportunities and at the same time retaining existing employment conditions, increasing city's tax base and above all improve the quality of life of people living in the city of Amsterdam. (Refer map 2 and 3). The airport is developed as an attractive environment for multinational companies, offering a huge variety of high-quality real-estate in the form of offices, industrial remises and logistics facilities. (Zamanov).

AAS Airportcity and work area Schiphol Real Estate



Map 2 – Zoning of Schiphol International Airport City, Amsterdam



Map 3-The Strategic Spatial Planning of an 'Airport City'; Case of Amsterdam Schiphol International Airport

2.1 Components within the airport

The Schiphol Airport includes many interesting elements inside its terminal including wide range of commercial services like restaurants, shops and bars, as well as leisure and tourism activities and so on.

The Airport's shopping center stocks a wide range of world class brands, which provides a wide range of choices to the travelers at reduced cost due to duty free shops (MXD Development Strategists / Stantec, 2015).

2.2 Components surrounding the Schiphol Airport

The surrounding of Schiphol Airport is surrounded by the High-end manufacturers and the Distribution centers surround the Airport area to transport products just in time.

Other service sectors, such as hotels, outlets, parks, hospitals, and schools, fill in the rest of the aerotropolis (Mauro Peneda, Prof. Rosário Macário, 20 october,2011).

3.Hong Kong International Airport (HKIA)

Hong Kong International Airport (IATA code: HKG) is the main airport in Hong Kong and is located on the island of Chek Lap Kok, land which has mainly been reclaimed explicitly for the building of the airport itself.

Hong Kong Airport is the world's busiest for cargo and one of the busiest in the world for passenger traffic. It is a hugely important hub for the region, connecting much of Asia with the rest of the world. It is home to one of the world's largest terminal buildings (Beata Gierczak-Korzeniowska, 2017).

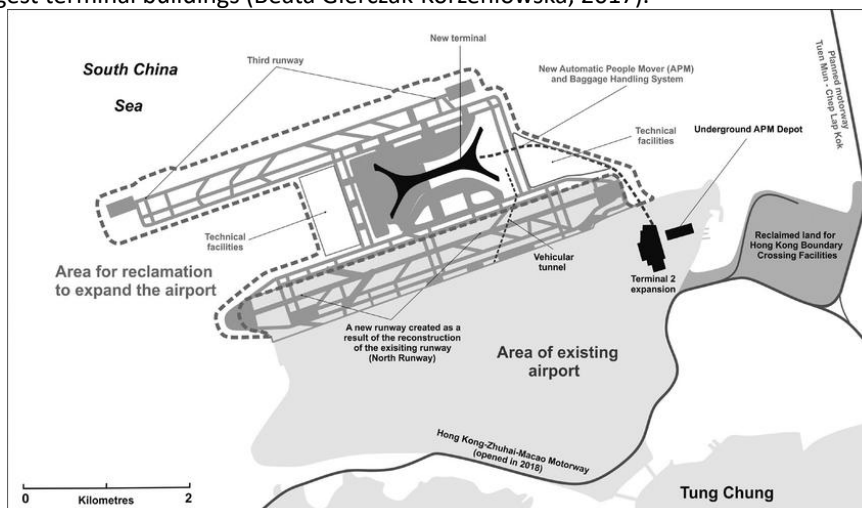


Figure 3-Layout of Hong Kong International Airport

Source- AAHK Sustainability Report (2018-19)

The airport is in operation 24 hours a day and is the main hub airport for Cathay Pacific, Cathay Dragon, Hong Kong Airlines, Hong Kong Express Airways and Air Hong Kong (cargo carrier). (Russell Publishing Ltd., 2022).

3.1 Components within the Airport

The Hong Kong International Airport comprises of the following components which are as follows-

1. Terminal 1 and Terminal 2
2. T1 Satellite Concourse and Midfield Concourse
3. Control tower and SkyPier opening

A new Sky Bridge connecting Terminal 1 and T1S opened in November 2022, allowing passengers to walk above taxiing planes, saving time from taking the airport shuttle bus. (Beata Gierczak-Korzeniowska, 2017).

3.2 Components surrounding the airport

Three commercial districts adjacent to or near HKIA's terminal and runways are

well along in development the 70-acre South Commercial District is composed of logistics facilities, including

(1) Trade port Hong Kong Ltd., constructed and operated by an international consortium of Asia and European Partners,

(2) HACTL's Super Terminal 1 (the world's largest stand-alone air-cargo and air-express facility with a gross area of 2.7 million sq. ft),

(3) the 2 million sq. ft. Asia Air Freight Terminal, and a 1.4 million sq. ft. mixed-use freight-forwarding warehousing and office complex. DHL recently opened its Asia air express hub in this zone, as well, with Cathay City (a major aviation-linked office complex) developing nearby. (International Journal of Scientific & Engineering Research Volume 9, Issue 11,, 2011).

SkyCity's first phase development also includes a 2 million sq. ft. international exhibition centre (Asia World Expo) with full-time trade rep offices, a China cross boundary ferry terminal, a 600-room hotel, and a 9-hole golf course that will go commercial in Future phases.

4. Zhengzhou Airport

Zhengzhou Xinxing International Airport is the main international airport serving Zhengzhou, the capital city of Henan province, China. The airport is located in Xinxing, 37 km (23 miles) southeast from Zhengzhou city centre. CGO Airport is a hub for Cargolux and as a focus city for China Southern Airlines, Donghai Airlines, Lucky Air, Shenzhen Airlines and West Air (JOHN D. KASARDA, 2019).

4.1 Components within the Airport

Zhengzhou Airport offers the following Services at their passengers' disposal:

1. Restaurants and cafeterias
2. Shops and Duty free
3. Ground Transportation Centre
4. ATMs
5. Banking services
6. Luggage Wrapping (Dept. of Global Studies & Geography, Hofstra University, New York, USA, 1998-2023).

4.2 Components surrounding the Airport

1. The number of warehouses, logistics and air express facilities encompasses 230,000 m² (2.5 million ft²),
2. The surrounding area includes an inspection area of 18,600 m² (200,200 ft²). (Refer Figure 4)
3. Total space of constructed buildings will exceed one million m² (10.8 million ft²) (Michael Chen, 2020).

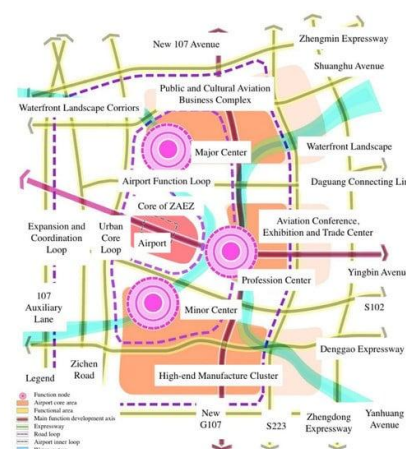


Figure 4 - Zoning of components of Zhengzhou Airport

CASE STUDIES OF INDIA

India's New Airport Privatization Models

Fueled by its booming economy and rapidly rising personal

incomes, India's commercial air travel grew by over 20 percent annually between 2000 and 2007..Since India's airport infrastructure is ill-equipped to accommodate such dramatic growth, the Ministry of Civil Aviation set about a two-fold process. India's GMR Group is heading the public-private partnership to modernize and expand Delhi International Airport (under the consortium name Delhi International Airport Limited (DIAL). (John D. Kasarda, 2008).

1.Delhi Aerotropolis (Indira Gandhi International Airport)

Delhi's International Airport, which spans 5,000 acres, was handed over to GMR in May 2006. In short order, plans were implemented for a new runway (the third) at DIAL and the new integrated passenger terminal (Terminal 3) capable initially of handling 30 million annually and expandable afterwards. Despite having a 5,000-acre property, DIAL is currently restricted by federal law to commercially developing only 250 acres of its airport land. It is, therefore, doing this wisely based on best use and highest value, following Aerotropolis principles (Delhi Airport, 2023).

1.1 Components within the airport

Indira Gandhi International Airport is a 5000 acre Airport complex including of the various components which are as follows-

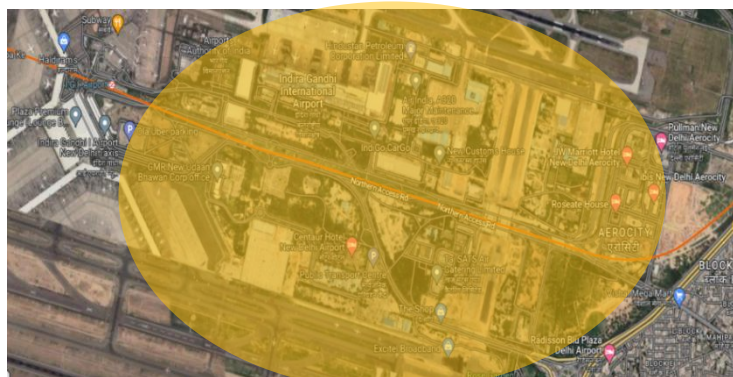


Figure 5- Area developed under Indira Gandhi International Aerotropolis

(SOURCE -<https://www.newdelhiAirport.in/>)

1. Integrated Terminal – International and Domestic
2. 9 level passenger terminal building and 2 piers each 1.2 km long.
3. 6 Common check-in islands -168 check-in counters
4. 78 Passenger Boarding Bridges (including 3 Passenger 6.7 million sq ft. of apron area & 100 room Transit Hotel for Domestic and International passengers (68 rooms for domestic transit and 32 rooms for international transit)
5. 96 automatic travelators /walkways (Longest one being 118 mts in length)
6. Over 20,000 sq mtrs. of retail space.
7. Multi-Level Car Park to accommodate 4300 cars (Delhi Airport, 2023).

1.2 Components surrounding to the Airport with its area

The first major Aerotropolis component to be developed is a hospitality and retail district located adjacent to DIAL's planned new private jet facility and National Highway 8. The district is composed of six land parcels:

(A) 5.5 acres for a 5-starplus deluxe hotel and premium apartment hotel with a maximum built-up area of 590,000 sq. ft.;

(B) a 4.7-acre parcel for another luxury hotel and apartment hotel of maximum 625,000 sq. ft.;

(C) 7.1 acres for a business and mid-market hotel, a mid-market condo hotel, office and retail space with maximum 970,000 sq. ft. built-up; (PIB Delhi, 2022).

(D) a 140-acre —High Street style pedestrian arcade surrounded by luxury, business, , mid-market hotels and condo hotels plus office, retail, and a hotel convention facility, including metro station access with a maximum gross build-out of 1.9 million sq. ft.;

(E) an 8.7-acre parcel for luxury and business hotels, luxury apartment hotels, office, and retail with maximum build-up of 1.2 million sq. ft. (F) a 5.0-acre parcel with proposed boutique, and luxury resort hotels, spas, and hotel villas (PIB Delhi, 2022).

2. Hyderabad Aerotropolis (Rajiv Gandhi International Airport)

Introduction to the Airport- Rajiv Gandhi International Airport is an international airport that serves Hyderabad, the capital of the Indian state of Telangana. It is located in Shamshabad, about 24 kilometres (15 mi) south of Hyderabad and it was opened on 23 March 2008 to replace Begumpet Airport, which was the sole civilian airport serving Hyderabad. It is named after Rajiv Gandhi, former Prime Minister of India. Built over an area of 5,500 acres (2,200 ha), it is the largest airport of India by area. It is owned and operated by GMR Hyderabad International Airport Limited (GHIAL), a public–private consortium. The fourth busiest airport in India by passengers traffic, it handled almost 21 million passengers and over 140,000 tonnes (150,000 short tons) of cargo (Airport authority of India, 2022).

Introduction to the Aerotropolis- GMR AeroCity Hyderabad is India's largest airport-based, mixed-asset integrated ecosystem, which provides a world of exciting real estate opportunities. Nestled in the vicinity of Hyderabad International Airport, AeroCity is creating a new urban landmark that encapsulates multiple asset classes, such as offices, retail, aerospace and industrial, logistics, education, healthcare and hospitality. The Business Park has it all to meet the growing demands of the office sector. As a one-stop destination for shopping and entertainment, the retail park offers a unique shopping experience with premium retail, gourmet dining, food court, cinema and family entertainment (GMR Hyderabad International Airport, 2023).

GMR AeroCity Hyderabad brings forth contemporary infrastructure designs in a pollution-free environment. Tap into a world of endless opportunities by leveraging the airport ecosystem. (GMR Hyderabad International Airport, 2023).

2.1 Components within the Airport

Apart from florists and pharmacies, the Airport features myriad souvenir shops as well as varied outlets, where you can buy clothes, accessories and other nice stuff.

2.2 Components surrounding the Airport with its areas

Rajiv Gandhi International Airport consists of various components surrounding it which forms the part of the Aerotropolis which are as follows-

1. Business parks, hotels, shopping malls, convention centers, and exhibition halls as well as an air cargo/industrial complex Zone West (landside) is envisioned as a core 250-acre multi-product special economic zone (SEZ).
2. Zone West is designated to house a 57-acre business park and Zone East (airside) have 125-acre aviation support SEZ.
3. 313 acres of commercial and mixed commercial development and 104-acre aircraft maintenance zone
4. a 5.2-acre business hotel,
5. 3.7 acres for service apartments (GMR Hyderabad International Airport, 2023).

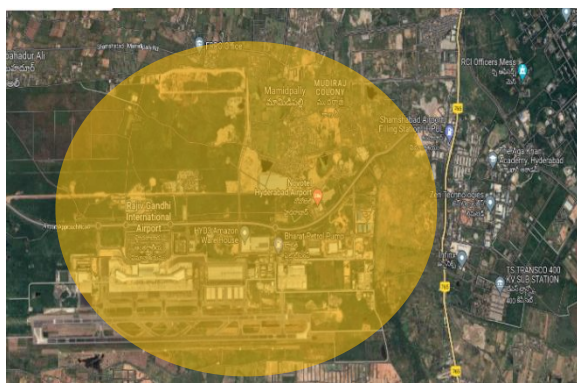


Figure 6- Layout of the development of Hyderabad Aerotropolis



Figure 7- 3d View of Hyderabad Aerotropolis and its urban imageability

Source- <https://www.hyderabad.aero/Airport-city.aspx>

3. Bengaluru Aerotropolis (Kempegowda International Airport)

Kempegowda International Airport is an international airport serving Bangalore, the capital of Karnataka, India. Spread over 4,000 acres (1,600 ha), it is located about 30 kilometers (19 mi) north of the city near the suburb of Devanahalli. It is owned and operated by Bengaluru International Airport Limited (BIAL), a public-private consortium. (kempegowda international airport Limited, 2023).

3.1 Components within the Airport

The airport has two passenger terminals that handles both domestic and international operations, and two runways.



Figure 8- Area developed for Bengaluru Aerotropolis

SOURCE-<https://www.bangaloreAirport.com/>



The services available at the terminal are ATMs, Baby care facilities, Business Center. Currency exchange, Duty free stores and Pharmacy (kempegowda international airport Limited, 2023).

3.2 Components surrounding the Airport with areas

Some of the components being developed surrounding the Airport are as follows -

1. 250 acres of an export-oriented aerospace SEZ.
2. The total area for Aerospace, SEZ and Hardware Park in 3,000 acres and house MNCs like Boeing and Airbus
3. The Karnataka Government has further identified up to 10,000 acres of land in the Devanahalli Taluk for setting up of an IT Investment Region (Airport authority of India, 2022).

DERIVED COMPONENTS OF CASE STUDIES

DERIVED COMPONENT	IDEAL AREA (IN ACRES)
Hotels, Entertainment, restaurants, mall	25 acres
Business Park, offices	5 acres
Residential	175 acres
Manufacturing and flex tech	10 acres
Distribution centre	6 acres
Medical and wellness clusters	5 acres
Exhibition complex and convention centre	5 acres
Cultural and heritage block	15 acres
Warehouses	21 acres
Transitional	25 acres
Research technology Park	8 acres
Retail /wholesale	17 acres
Forest or vacant land	35 acres
Park/ golf / Cemetery	80 acres
Industrial Park	20 acres
Logistics Park and free trade zone	5 acres
Institutions	25 acres
Parking	8 acres
Freight hub	10 acres

CONCLUSION

The conclusion derived from case studies of aerotropolis, which refers to the development of an urban area centered around an airport, can vary depending on the specific case and context. However, some common observations and conclusions can be drawn from these studies:

Economic Benefits: Aerotropolis development has the potential to bring significant economic benefits to a region. By creating an integrated hub of air transport, logistics, and business activities, aerotropolis projects can attract investment, stimulate job growth, and enhance trade and connectivity.

Job Creation: Aerotropolis development often leads to the creation of jobs in various sectors such as aviation, logistics, tourism, and hospitality. This can have a positive impact on employment rates and the overall economy of the region.

Urban Development and Infrastructure: The development of an aerotropolis often involves significant urban planning and infrastructure investments. This can result in the expansion and improvement of transportation networks, including road and rail connections, as well as the development of commercial, residential, and recreational spaces. However, careful planning is required to ensure the efficient use of land and resources and avoid negative environmental impacts.

Challenges and Considerations: While aerotropolis development offers various benefits, there are also challenges and considerations that need to be addressed. These include environmental concerns, such as increased carbon emissions and noise pollution, as well as the need for careful land use planning, infrastructure investment, and community engagement to ensure the sustainable and inclusive development of the aerotropolis.



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