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Investigation of the aerotropolis concept and its transferability around the world

Abstract

Academic literature and the industry highlight the airport-driven development (ADD) for this 21st Century. Several different types of ADD concepts have been defined, but there are differences between authors about definitions. The definitions give a sense that the ADD concepts are cleared defined by researchers and are plenty used by airport planners in their planning documents (e.g., master plans) and the marketing materials (e.g., brochures and airport websites). However, by searching for examples of ADD concepts in academic literature, it was found that these concepts are used indiscriminately and still have some particularities that can create conceptual confusion. This possible conceptual confusion has raised some questions about how and whether these concepts are used in the industry. Studies have not discussed the presence and usage of these terms as an integral part of airport planning documents and marketing material. Planning documents and marketing materials are usually drawn up by airport planners to guide their actions in the long term, and to meet local, state, and national aviation goals. There are four different purposes of the paper to (1) compare definitions of the airport-driven development concepts in the academic literature, (2) compare definitions with real-life examples given by researchers; (3) compare academic definitions and examples with industry usage, as found on airport websites and in airport planning documents; and (4) find out aspects of the transferability of the ADD concepts (from one region to another and from the academic literature to the industry and vice-versa). Based on the airport websites and master plans, it was found that the aerotropolis and airport city are used interchangeably by researchers but not by the industry. The industry uses interchangeable the airport city concept with another name or just including the airport's name. Additionally, the industry uses together airport city & aerotropolis or only the aerotropolis concept, as shown in several airports in North America and Latin America, and East Asia & Pacific. Furthermore, European airports are mainly classified as airport cities, as mentioned in academic literature. This paper points out similarities to closer regions regarding the transferability of the aerotropoli and airport cities concepts between European countries and the Global North to the Global South.

Keywords: Aerotropolis; Airport city; Concept; Master plans; Transferability

1. Introduction

Since the beginning of the 21st Century, airports have increased their relevance, particularly as a potential tool for fostering economic development on a local, regional, and metropolitan scales. As mentioned by Baker, Merket and Kamruzzaman (2015, p. 1), “airports have an impact on regional economic growth and the economy directly impacts regional air transport”. Several researchers have named this relevance as airport-centric development or airport-driven urban development and defined various types of airport-driven development concepts (ADD) (Freestone, 2009; Freestone and Baker, 2011; Kasarda, 2000; Mokhele, 2018a; Pi et al., 2021). In particular, (Boloukian, 2018; Correia and De Abreu E Silva, 2015; R. Freestone and Baker, 2011; González, 2013; Stangel, 2019; Ventura et al., 2020; Wach-Kloskowska, 2020) described that list of six concepts Airfront, Decoplex, Airport City, Airport Corridor, Aerotropolis and Airea. According to Freestone and Baker (Freestone and Baker, 2011), one of the differences between the ADD concepts is the way airport development affects planning and mixed land use from the airport fringe zones (e.g. airfront, decoplex, and airport city) to the metropolitan region (e.g. airport corridor, aerotropolis and airea). Other authors have discussed alternative concepts such as skycity, aviapolis and airport metropolis (Alkaabi et al., 2013; Boloukian and Siegmann, 2016; Liou et al., 2016; Stevens et al., 2010; Vasconcelos, 2007; Wang and Hong, 2010).

Among these ADD concepts, the aerotropolis (ATP) and airport city (AC) concepts are the most common terms presented and discussed in academic literature (Mokhele, 2018a). “Airport city is associated with the growth of economic activities around

airports because of their dependence upon airports (see Conway 1993; Kasarda 2009; Walker & Stevens 2008) […]" (Mokhele, 2018). A common definition developed by Kasarda is the airport city as the core of the aerotropolis and followed by other authors (Ashford et al., 2011; Boloukian and Siegmann, 2016; Freestone and Baker, 2011; Stevens and Baker, 2013). However, this idea appears not to be the same as for others. When defining the aerotropolis concept, authors sometimes do not even mention the airport city concept and vice-versa (Kowalczyk and Gierczak-Korzeniowska, 2019; Ofuebe and Paul, 2019; Sun and Ma, 2020; Walcott and Fan, 2017). Even so, there is no consensus about their definition in academic literature (Peneda *et al.* 2011, p.8; Fernandes Correia and de Abreu e Silva, 2015, Liou et al. (2018p. 11)), or they are used indiscriminately (Banai, 2017, p. 1). Whilst, researchers give examples of industry airports which manifest ADD concepts, there is no consensus of these examples, as mentioned by Correia and De Abreu e Silva (2015). This is confirmed within this paper (i.e. one author's is an aerotropolis, and one author's is an airport city). Kasarda (2013) has a list of 84 airports defined by him as airport cities or aerotropoli (Kasarda, 2013). For example, Kasarda classified Hong Kong, Paris, Amsterdam and Dallas as aerotropolis, particularly in operation, and authors classified them as airport cities or skycity or airport corridor (Alkaabi et al., 2013; González, 2013; Liou et al., 2018; Schaafsma, 2003; Wang and Hong, 2010).

If there is a lack of clarity in the academic world, there is likely to be a lack of clarity in the non-academic world (e.g., airport strategy documents or on airport websites). The hypothesis was "the conceptual confusion of the ADD concepts in academic literature would influence industry airport planning". This could be a problem because ADD schemes need a huge amount of money (Almeida et al., 2019; Amcham, 2019; Kasarda and Chen, 2021), and if it is poorly conceptualized, it could be wasted. Furthermore, ADD concepts arose from North America and Europe (Blanton, 2004; Güller and Güller, 2001; Kasarda, 2019; Schlaack, 2009), and it is likely to be a particular issue when they travel to the Global South (GS). The way the ADD concepts travel is still in its infancy, particularly regarding Latin American & the Caribbean regions. One example of travelling concepts from the GN to GS is mentioned by Rogerson (2018): "the international diffusion of the aerotropolis concept and its application for planning airports and urban development" spread to the African continent.

Therefore, there are four different purposes of the paper: (1) to compare definitions of the airport-driven development concepts in the academic literature, (2) compare definitions with real-life examples given by researchers; (3) compare academic definitions and examples with industry usage, as found on airport websites and in airport planning documents; and (4) To find out aspects of the transferability of the ADD concepts (from one region to another and from the academic literature to the industry and vice-versa). By reaching each aim as mentioned above, this paper contributes to academic terms because it demonstrates the existence of the conceptual confusion and flexibility of the ADD concepts, particularly about the airport city and aerotropolis concepts, in academic literature. Additionally, this paper shows a gap between the way researchers classify airports and how airport planners elaborate their strategic plans. It suggests that the academy does not interfere in planners' planning their airports and surroundings since it seems they plan according to their will and interests. Further, in terms of management implications for the industry, mapping where airports are located and how they classify themselves can generate an idea of clusterization and give them ways to try to stand out from other airports and regions.

This paper is organized into six sections: it starts with this Introduction, followed by Section 2 – Methodology, which explain how the research was undertaken by each aim. Section 3 reviews the airport-driven development concepts defined by different authors, and highlights the differences. Section 4 gives industry examples of where the ADD concepts have been implemented, highlighting where authors disagree about the examples. Section 5 presents the survey of planning documents and airport websites, is based on Kasarda's list of 84 airports which was mentioned above. Followed by Section 6, which gives the results of a comparison between ADD concepts in academic literature and of planning documents, and airport websites. It also discusses the travel of the ADD concepts to the Global South. Section 7 draws conclusions.

2. Methodology

This Section presents the way the research was undertaken according to each aim. Therefore, it is divided in four steps as presented below:

i. To compare definitions of the airport-driven development concepts in the academic literature.

This aim aimed to check the way the airport-driven development concepts were defined and used in academic literature. Academic literature here was defined as papers, books, dissertations, and theses available on databases such as Scopus, Elsevier, online repositories, and libraries of universities around the world. The time frame of the found documents was between 2007 to 2020. This step was undertaken by searching for airfront, decoplex, airport city, airport corridor, aerotropolis, airea, definitions presented by Freestone and Baker (2011), and Ventura et al. (2020). The authors carried out this search from January 2018 to May 2020, and the number of the selected records was 37. Additionally, there was a search on NGram related to the frequency of the ADD concepts in GoogleBooks (FIG. 1) to check the frequency of the ADD concepts over time.

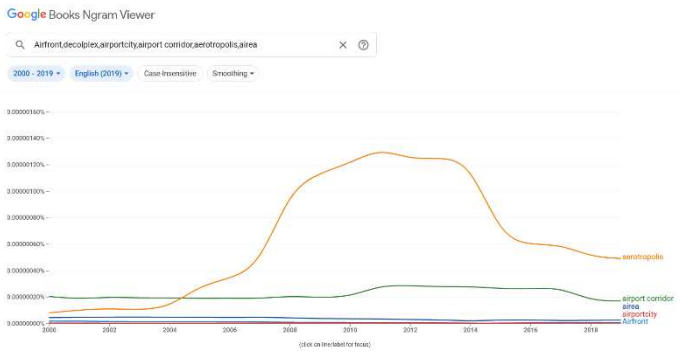
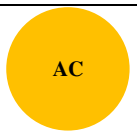
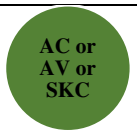
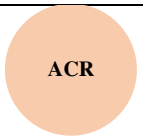
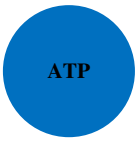
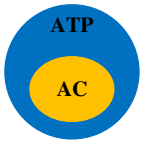
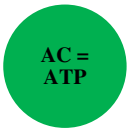
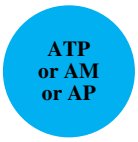


Figure 1 Frequency of the Airport-Driven Development Concepts over time

After selecting papers that referred to the ADD concepts, mainly regarding their definitions, the authors have created Table 1 based on their interpretation of how researchers mentioned each ADD term. For example, Table 1 illustrates the authors' interpretation of how researchers likely interpreted the ADD concepts. It is presented by using diagrams for better visualization. For example, when authors wrote airport city & aerotropolis, the current authors interpreted it as the airport city being the core of the aerotropolis, as separated but complementary entities. For the "airport city or aerotropolis", the interpretation was the terms are often used interchangeably to describe the same airport.

Table 1 Current author's interpretation of the used terms (ADD concepts) in the academic literature represented by the diagrams

Terms used in the text	Representation of the term	Current authors' interpretation
"Airport city (AC)"		Researchers define only the airport city term in the text.
"Airport City or Aviapolis (AV)"; "Airport City or Skycity (SKC)"		Researchers define the terms as used interchangeably.
Airport Corridor (ACR)		Researchers define only the airport corridor concept in the text.
"Aerotropolis (ATP)"		Researchers define only the Aerotropolis concept in the text.
"Airport city & Aerotropolis (AC&A)"		Researchers define the airport city being the core of the aerotropolis, a different entity but complementary entities.
"Airport city or Aerotropolis (AC_or_A)"		Researchers define the concepts as used interchangeably.
"Aerotropolis (ATP) or Airport Metropolis (AP)"; "Aeropolis (AP)"		Researchers define the concepts as used interchangeably.

Airea		Researchers define only the airea concept in the text.

The authors created tables describing the ADD definitions, citing the researchers who referred them and mentioning some main points related to the definitions (Tables 5 to 7). These main points were based on the authors' interpretation of the definition written in each academic text. They were created to identify some patterns in the definitions (e.g. differences or similarities).

ii. To compare definitions with real-life examples given by researchers.

This aim aimed to identify whether researchers related and named the industry airports according to a specific ADD concept. Additionally, it sought to check whether researchers classified the airports in the same way. Hence, the previous academic literature was the central database used for this step, where authors searched for airports and ADD concepts in the texts. Therefore, it was possible to check the way researchers classified airports and the region they were located, and to compare between them.

Further, for this comparison it was also used the 84 industry airports listed by Kasarda (2013), and the World Bank income group[*] (2018). Kasarda (2013) listed and classified 84 airports worldwide as airport cities and aerotropoli in different stages. These stages are developing and operational airport cities and developing, and operational aerotropolis—this paper abbreviated them (same order aforementioned) as DV_AC, OP_AC, DV_ATP and OP_ATP (Table 9). According to Kasarda (2013), either developing or operational is based on qualitative and quantitative data. This data is derived from assessing the airport and surrounding area, aviation-linked business and industry cluster research, and substantial evidence gained from strategic plans, government reports, and media announcements. However, Kasarda does not explain the criteria for this assignation thoroughly; this paper considers substantial evidence for commitment implementation when the AC and ATP terms were cited in press releases or on airport websites and mainly in master plans available online.

By doing that it was possible to create Table 8, the map (FIG. 1), and the Table 9. Therefore, the section 4 was divided by 4.1. Comparison of the industry examples of the ADD concepts between researchers (Table 9), and 4.2. Displaying the 84 airports listed by Kasarda (2013) (FIG).

Table 8 was created to demonstrate the main findings related to the examples of airports which had different classification by authors. Therefore, it shows visually the ADD concepts (column "Representation of the term"), and the various terms the airports were classified by region. Regarding airport regions, although this paper has not focused on examining the causal relationship between air transport and economy growth, this paper considered the results of this causality because, according to Hakim and Merkert (2016, p. 1) the "spatial dimensions and context matter (i.e. low income and large populations)".

The map (FIG. 1) was created to visualise globally the airports classified by Kasarda (2013) by region. By considering the World Bank Income Group, it was possible to see whether there were similarities of the ADD concepts according to the world location, as following: East Asia & Pacific (EAP), Europe & Central Asia (ECA), Latin America & Caribbean (LAC), Middle East & North Africa (MENA), North America (NAM), South Asia (SAS), and Sub-Saharan Africa (SSA).

Table 9 shows similarities and differences in the examples of airports mentioned by the authors and a comparison of the regions, countries, airport names, and the way Kasarda (2013) and researchers classified the industry airports. Therefore, it was possible to identify whether airports were classified, mainly by researchers.

iii. To compare academic definitions and examples with industry usage, as found on airport websites and in airport planning documents.

This aim aimed to check whether the airport-driven development terms were mentioned on the airport websites and current planning documents. It was done to identify similarities in ADD usage between the academic literature and the industry by considering that the conceptual confusion in academic literature was likely to interfere in the industry.

The authors carried out this research from January to June 2018 based on the 84 airports listed by Kasarda (2013). The authors were aware of the airports' vast area (globally) and the plenty of differences between countries worldwide, such as language and no standard of the planning documents. Therefore, this search focused on planning documents written in English, Portuguese or Spanish and considered the planning documents as master plans, strategic plans, blueprints, brochures, presentations (an executive summary of the master plan), and airport webpages. The time frame of the found documents was between 2008 to 2018, with master plans valid by five to ten years. Two airport websites were unavailable, and the author did not find the master plans on the airport websites for 30 airports. The authors found a total of 103 (Table 2) miscellaneous records, including others that they have not considered, such as annual reports, and airport economic impact studies and sometimes more than one document by the airport. Therefore, there was a filter of 59 documents (Table 3); around 57% of the documents were analyzed.

[*] https://datahelpdesk.worldbank.org/knowledgebase/articles/906519-world-bank-country-and-lending-groups Access in Feb. 2018.

Table 2 Number of types of documents found by airports and their regions

Region, type of document and airport reference	Number of documents for each airport
EAP	**16**
Doc not found	**5**
Beijing Capital International Airport	1
Shanghai Pudong International Airport	1
Singapore Changi Airport	1
Subic Bay International Airport	1
Zhuhai Jinwan Airport	1
Master plan	**3**
Brisbane Airport	1
Hong Kong International Airport	1
Kuala Lumpur International Airport	1
Webpage	**2**
Clark International Airport	1
Guangzhou Baiyun International Airport	1
Brochure	**2**
Incheon International Airport	1
Kuala Lumpur International Airport	1
Annual report	**2**
Incheon International Airport	1
Taiwan Taoyuan International Airport	1
Site unavailable	**1**
Bangkok Suvarnabhumi Airport	1
Presentation	**1**
Taiwan Taoyuan International Airport	1
ECA	**25**
Doc not found	**10**
Athens International Airport "Eleftherios Venizelos"	1
Barcelona El Prat Airport	1
Bremen Airport	1
Budapest Ferenc Liszt International Airport	1
Frankfurt-Hahn Airport	1
Moscow Domodedovo Airport	1
Paris Vatry Airport	1
Stockholm Arlanda Airport	1
Vienna International Airport	1
Warsaw Chopin Airport	1
Master plan	**5**
Dublin Airport	1
Helsinki-Vantaa Airport	1
London Heathrow Airport	1
Manchester Airport	1
Oslo Airport, Gardermoen	1
Webpage	**4**
Helsinki-Vantaa Airport	1
Munich Franz Josef Strauss Airport	1
Oslo Airport, Gardermoen	1
Stockholm Arlanda Airport	1
Brochure	**3**
Dublin Airport	1
Frankfurt Airport	1
Manchester Airport	1

Strategic plan	**2**
Amsterdam Schiphol	1
Paris Charles de Gaulle Airport	1
Annual report	**1**
Zurich Airport	1
LAC	**5**
Webpage	**2**
Belo Horizonte International Airport	1
Tocumen International Airport	1
Presentation	**1**
Tocumen International Airport	1
Annual report	**1**
Tocumen International Airport	1
Master plan	**1**
Belo Horizonte International Airport	1
MENA	**6**
Webpage	**3**
Abu Dhabi International Airport	1
Cairo International Airport	1
Jeddah King Abdulaziz International Airport	1
Master plan	**2**
Dubai Al Maktoum International Airport	1
Dubai International Airport	1
Viability study	**1**
Cairo International Airport	1
NAM	**45**
Master plan	**15**
Charlotte Douglas International Airport	1
Cleveland Hopkins International Airport	1
Denver International Airport	1
Detroit Metropolitan Wayne County Airport	1
Edmonton International Airport	1
Hartsfield-Jackson Atlanta International Airport	1
John C. Munro Hamilton International Airport	1
Louisville International Airport	1
Memphis International Airport	1
Milwaukee General Mitchell International Airport	1
Newark Liberty International Airport	1
Phoenix-Mesa Gateway Airport	1
Piedmont Triad International Airport	1
Ted Stevens Anchorage International Airport	1
Vancouver International Airport	1
Doc not found	**10**
Baltimore-Washington International Airport	1
Huntsville International Airport	1
Indianapolis International Airport	1
Jackson-Medgar Wiley Evers International	1
McCarran International Airport	1
Miami International Airport	1
Northwest Florida Beaches International Airport	1
Philadelphia International Airport	1
Rickenbacker International Airport	1
Washington Dulles International Airport	1

Strategic plan	**5**
Dallas-Ft. Worth International Airport	1
Edmonton International Airport	1
LA/Ontario International Airport	1
Lambert-St. Louis International Airport	1
Memphis International Airport	1
Webpage	**4**
Chicago O'Hare International Airport	1
Minneapolis-Saint Paul International Airport	1
Orlando International Airport	1
Raleigh-Durham International Airport	1
Viability study	**3**
Cleveland Hopkins International Airport	1
Denver International Airport	1
Edmonton International Airport	1
Presentation	**2**
Denver International Airport	1
Los Angeles International Airport	1
Site unavailable	**1**
Kansas City International Airport	1
Blueprint	**1**
Hartsfield-Jackson Atlanta International Airport	1
Capital Improvement Plan	**1**
Fort Worth Alliance Airport	1
Impact study	**1**
Pittsburgh International Airport	1
Advisory Panel	**1**
John F. Kennedy International Airport	1
Land use Strategy	**1**
Phoenix Sky Harbor International Airport	1
SAS	**4**
Doc not found	**3**
Cochin International Airport	1
Delhi Indira Gandhi International Airport	1
Hyderabad Rajiv Gandhi International Airport	1
Webpage	**1**
Bengaluru International Airport	1
SSA	**2**
Doc not found	**2**
Durban King Shaka International Airport	1
O.R. Tambo International Airport	1
Total	**103**

Table 3 Number of the planning documents filtered by the criteria of the research by region and airports

Planning documents by Region and Airports	Number of planning documents by airport
EAP	**8**
Master plan	**3**
Brisbane Airport	1
Hong Kong International Airport	1
Kuala Lumpur International Airport	1
Brochure	**2**
Incheon International Airport	1

Kuala Lumpur International Airport	1
Webpage	**2**
Clark International Airport	1
Guangzhou Baiyun International Airport	1
Presentation	**1**
Taiwan Taoyuan International Airport	1
ECA	**14**
Master plan	**5**
Dublin Airport	1
Helsinki-Vantaa Airport	1
London Heathrow Airport	1
Manchester Airport	1
Oslo Airport, Gardermoen	1
Webpage	**4**
Helsinki-Vantaa Airport	1
Munich Franz Josef Strauss Airport	1
Oslo Airport, Gardermoen	1
Stockholm Arlanda Airport	1
Brochure	**3**
Dublin Airport	1
Frankfurt Airport	1
Manchester Airport	1
Strategic plan	**2**
Amsterdam Schiphol	1
Paris Charles de Gaulle Airport	1
LAC	**4**
Webpage	**2**
Belo Horizonte International Airport	1
Tocumen International Airport	1
Master plan	**1**
Belo Horizonte International Airport	1
Presentation	**1**
Tocumen International Airport	1
MENA	**5**
Webpage	**3**
Abu Dhabi International Airport	1
Cairo International Airport	1
Jeddah King Abdulaziz International Airport	1
Master plan	**2**
Dubai Al Maktoum International Airport	1
Dubai International Airport	1
NAM	**27**
Master plan	**15**
Charlotte Douglas International Airport	1
Cleveland Hopkins International Airport	1
Denver International Airport	1
Detroit Metropolitan Wayne County Airport	1
Edmonton International Airport	1
Hartsfield-Jackson Atlanta International Airport	1
John C. Munro Hamilton International Airport	1
Louisville International Airport	1
Memphis International Airport	1
Milwaukee General Mitchell International Airport	1

Newark Liberty International Airport	1
Phoenix-Mesa Gateway Airport	1
Piedmont Triad International Airport	1
Ted Stevens Anchorage International Airport	1
Vancouver International Airport	1
Strategic plan	**5**
Dallas-Ft. Worth International Airport	1
Edmonton International Airport	1
LA/Ontario International Airport	1
Lambert-St. Louis International Airport	1
Memphis International Airport	1
Webpage	**4**
Chicago O'Hare International Airport	1
Minneapolis-Saint Paul International Airport	1
Orlando International Airport	1
Raleigh-Durham International Airport	1
Presentation	**2**
Denver International Airport	1
Los Angeles International Airport	1
Blueprint	**1**
Hartsfield-Jackson Atlanta International Airport	1
SAS	**1**
Webpage	**1**
Bengaluru International Airport	1
Total	**59**

After selecting the planning documents, there were two questions to answer and to search on them:

Q1. Are there any airport-driven development concepts mentioned on the airport websites and in the planning documents?

Q2. Do the findings have similarities with the results of the academic literature?

These questions were answered by searching for terms as airfront, decoplex, airport city, airport corridor, aerotropolis, skycity, aviapolis, and airea on the airport websites, local and state government websites or specific websites (a website apart from the airport website). The search included spelling variants (e.g. airport cities, airport city, and aerotropoli(s)(ses)) and the keywords master plan, business plan, and strategic plan.

iv. To find out aspects of the transferability of the ADD concepts (from one region to another and from the academic literature to the industry and vice-versa).

After organizing data from the previous steps (aims), identifying and analyzing differences and similarities between the definitions of the airport-driven development concepts (ADD) in academic literature and non-academic literature was discussed the hypothesis. The hypothesis was the conceptual confusion of the ADD concepts in academic literature would influence industry airport planning". It means that airport planners and city planners would also have different interpretations of the ADD concepts, and this difference could be seen through how the planning documents were written and planned. The authors created tables 11 to 17 to compare the terms used in airport master plans and airport websites by location of the airports to find out aspects of the transferability of the ADD concepts.

3. The definitions of airport-driven development concepts (ADD concepts)

Correia and De Abreu E Silva (2015), Freestone and Baker (2011), González (2013), Kasarda (2019) and Wach-Kloskowska (2020) define and show examples of ADD concepts. Table 4 presents the definitions of the ADD concepts, according to Freestone and Baker (2011) and Ventura et al. (2020). As mentioned previously in academic literature, there are other ADD concepts such as aviapolis (Boloukian and Siegmann, 2016; Freestone and Baker, 2011; Kim, 2010; Ventura et al., 2020) and aeropolis (Freestone and Baker, 2011; LIU, 2019), but they are not often defined or given examples of airports as airport cities and aerotropoli. Tables 5 to 7 present several definitions of the ADD concepts, according to the academic literature with texts from 2003 to 2021.

Table 4 A couple of definitions of the airport-driven development concepts in academic literature

ADD concepts	Definitions
Airfront	It is the "myriad of commercial, industrial, and transportation facilities and services intrinsically tied to the airport". It “pursues local and regional objectives and exploits the airport as an economic resource. Urban development around the infrastructure is based on an industrial cluster” (Blanton, 2004).
Decoplex	It is "an intermediate urban scale featuring a jetport alongside planned industrial sites, offices, hotels, and waste treatment facilities with all core units having direct runway taxiways."
Airport city	It is "the more or less dense cluster of operational, airport-related activities, plus other commercial and business concerns, on and around the airport platform."
Airport Corridor	It links the airport and central city as a band of integrated road/rail infrastructure and property development
Aerotropolis	It consists of a core "airport city" at the epicentre of a wider metropolis and interconnected by dedicated motorways ("aerolanes") and high-speed rail links ("aerotrains") with outlying aviation-oriented business precincts such as e-commerce fulfilment centers, business and logistic parks, retail complexes, hotels, and free trade zones.
Airea	It denotes the "heterogenic configuration of spread islands within the wider metropolitan area."

Source: Freestone and Baker (2011), and Ventura et al. (2020), adapted.

The way these ADD concepts are presented by Freestone and Baker (2011) (Table 4) seems they are an evolution of the ADD concepts. Branco (2013) describes the aerotropolis as the evolution of the airport city, and Ventura et al. (2020) mention an aerotropolis as a natural evolution of the airport city. It suggests that as airports grow and evolve towards metropolitan regions, and the more features they have (e.g. airport-related activities, transport corridors, and residential developments), they become more complex. Hence, they reach another stage of these ADD concepts, notably achieving the aerotropolis status. For Kadarisman (2019), “Aerotropolis is a modification of Aerocity (Norman, 2011), in which Aerocity covers a city, whereas Aerotropolis refers to a region. This implies that the area of the Aerotropolis is greater than that of an Aerocity”.

Kasarda (2019) defines an aerotropolis (Table 7) as "a new urban form that relies on an airport and its integrated surface transportation infrastructure […]. It consists of a multimodal airport-based commercial core (Airport City) […]”. This author and Ashford et al. (2011), Stevens and Baker (2013) and Wach-Kloskowska (2020) define an airport city as the core of the aerotropolis. It suggests that the airport city concept is integrated into the aerotropolis and necessary being one part of it. However, this idea appears not to be the same as other authors because sometimes they do not even mention the airport city and mention only aerotropolis or vice-versa (Setiawan et al., 2020; Wang et al., 2013).

Therefore, it is possible to see some ADD concepts that are still being used interchangeably or having different interpretations such as the airport city mentioned by Peneda et al. (2011) as a business model or a marketing strategy related to the spatial form. The ADD concepts' conceptual confusion may start with their similarities and differences that can contribute to uncertainty. Based on the definitions and features of the ADD concepts, as presented in tables 5 to 7 (in the appendix) and by observing Kasarda's aerotropolis diagram (Kasarda, 2019), it suggests that both concepts have similarities that might cause confusion and generate different interpretations and usage of these terms. Regarding the features, the airport city and aeropotrolis seem to have similarities, both involving aeronautical and non-aeronautical structures (e.g. logistic parks, services and office parks) on and around airports (Güller and Güller, 2003p. 14; Ventura et al., 2020; Wach-Kloskowska, 2020). Wang et al., 2020 mention that “the Airport City theory suggests developing the industries related to air transport by building complexes around airports.”

The difference between the aerotropolis and airport city seems to be mainly related to spatial form (i.e. inside and outside the airport area) (Freestone, R. and Baker, 2011, and Drljača et al., 2019), and the type of governance (i.e. airport authority and mixed jurisdictional) (González, 2013). Drljača et al., 2019 states that the AC "has an internal and external context. Its internal context comprises an airport (runway, passenger terminal, etc.) and other AC facilities such as hotels, congress centres, […] and others. Its external context is made up of Aerotropolis (Kasarda, 2008)". For Wach-Kloskowska, 2020, "the airport city may be the centre of a larger area around the airport, sometimes defined as an aerotropolis, especially in the USA, which means a vast urban form that is in some respects similar to a metropolis formed around an airport". Like Kasarda 2000 and Antipova 2013, an aerotropolis has a major airport as the centre of a region transforming its surroundings.

Several authors mention the aerotropolis area, such as extending up to 30 km from airports Mokhele, 2018, p.1 Ventura et al. 2020 Wang et al. 2020 or often without going more than 15 minutes from the airport (Sun, T. and Shuyun Ma., 2020). Although Kasarda (2017 p.45) referenced that distance is not as relevant as time and connectivity, in terms of time, he highlighted: "no concrete, agreed-upon connecting time measure has been established, although a 20- or 30-minute radius has been used to set outer boundaries in some aerotropolis master plan studies.".

The aerotropolis concept seems to be adjustable and changeable for each place. Freestone and Baker (2011 p.268) mentioned the flexibility of interpretation of the aerotropolis concept: “the aerotropolis label has been applied flexibly to a diversity of environments, planned, and unplanned”. This flexibility gives the definition one uncertainty to define and give examples that refer to an aerotropolis. That is why these authors searched in academic literature for the airport-driven development concepts and the examples of airports that researchers linked for each one.

4. Industry examples of the ADD concepts mentioned in academic literature and the 84 airports listed by Kasarda (2013)

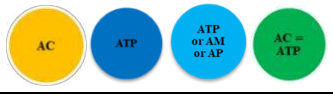
This Section presents the findings related to the search of the industry airports examples of the ADD concepts in academic literature and the comparison of them to the 84 airports listed by Kasarda (2013). Several researchers who have mentioned the airport-driven development concepts in their papers sometimes define the ADD concepts, but sometimes they only allusion to the term(s). Sometimes they give a couple of industry examples of airports for (each) the ADD concepts but sometimes do not. A couple of differences were found by searching for industry examples of airports related to the ADD concepts in academic literature. Table 8 shows some findings of this search and compares the way airports were classified by Kasarda (2013) and researchers by worldwide regions. For example, in Europe & Central Asia Region, the Amsterdam Schiphol Airport, in Netherlands, was classified as an aerotropolis by Alkaabi and Debbage (2011), Berawi et al. (2018), Charles et al. (2007), Kasarda (2017), Peneda et al. (2011) and Yangmin et al. (2021); as an airport city by Freestone and Baker (2011), González (2013), and Wang et al. (2011); as an aerotropolis or airport metropolis, by Liou et al. (2018); as an aerotropolis or airport city, by Addie, J.-P.D. (2014); and finally, as an airport corridor by Stevens et al. (2010).

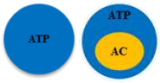
Regarding these regions, it was possible to check the frequency of the examples that airports were cited in academic literature. Ten airports in East Asia & the Pacific were mentioned by researchers and Kasarda (2013). Out of these airports, the most cited airports were Incheon International Airport (15), Singapore Changi Airport (9), Hong Kong International Airport (7), Taiwan Taoyuan International Airport (4) and Kuala Lumpur International Airport (4). Four airports were mentioned in South Asia (once each one). Two in Sub-Saharan Africa (once each one). Two airports in the Middle East & North Africa, but Dubai AL Maktoum International Airport was the most frequent (5). Nine airports in Europe & Central Asia, and the most frequent were Amsterdam Schiphol (13) and Frankfurt International Airport (4). Three airports were mentioned in Latin America & the Caribbean, but Belo Horizonte International Airport (4) was the most frequent. Finally, nine in North America with the most frequent airports Dallas Fort-Worth International Airport (11) and Memphis International Airport (5).

4.1. Comparison of the industry examples of the ADD concepts between researchers

These findings show that the same airport had different classification by researchers (Tables 8 and 9). For example, airports were classified differently, sometimes as an airport city, sometimes as an aerotropolis, sometimes both, and sometimes skycity, or airea, or airport corridor.

Table 5 Examples of ADD concepts and airports mentioned in the academic literature represented by the diagrams, by regions

Regions	Examples of airports	Terms mentioned in academic literature related to the airports	Representation of the terms
East Asia & Pacific	Hong Kong International Airport	“airport city”, “aerotropolis”, and “skycity”	
	Incheon International Airport	“airport city”, “aerotropolis”, and “aerotropolis or airport city”,	
	Singapore Changi International Airport	“airport city”, “aerotropolis”, and “aerotropolis or airport metropolis”	
Middle East	Cairo International Airport	“aerotropolis or airport city”	
	Dubai AL Maktoum International Airport	“aerotropolis”, and “aerotropolis or airport city”	
Europe	Amsterdam Schiphol International Airport	“airport city”, “aerotropolis”, “aerotropolis or airport metropolis”, and “aerotropolis or airport city”	

	Frankfurt International Airport	“airport city”, “aerotropolis”, and “aerotropolis or airport city”	
	Helsinki-Vantaa International Airport	“airport city”, “airport city or aviapolis”	
	Paris Charles de Gaulle International Airport	“aerotropolis” and “airport corridor”	
	Zurich International Airport	“airport city”, and “airport corridor”	
North America	Dallas-Fort Worth International Airport	“airport city”, “aerotropolis”, and “aerotropolis or airport metropolis”	
	Memphis International Airport	“aerotropolis”, and “aerotropolis & airport city”	
Latin America & Caribbean	Belo Horizonte International Airport	“aerotropolis”, and “aerotropolis or airport city”	

Legend: AC = airport city; ATP = aerotropolis; ACR = airport corridor; AM = airport metropolis; AV = aviapolis; SKC = skycity

From Asia, the airports were identified as “airport city”, “aerotropolis”, “aerotropolis or airport metropolis”, and “skycity”. From the Middle East, the airports were defined as “aerotropolis” and “aerotropolis or airport city". From Europe, the airports were designated as “airport city”, “airport corridor”, “aerotropolis”, “aerotropolis or airport city”, “aerotropolis or airport metropolis”, and “airport city or aviapolis”. From Latin America & the Caribbean, the airport was defined as “aerotropolis” and “aerotropolis or airport city”. Finally, from North America the airports were defined as “airport city”, “aerotropolis”, “aerotropolis or airport metropolis”, and “aerotropolis & airport city”. Based on these findings, the lack of consensus in the definition of the ADD concepts seems to remain. It shows a possible divergence regarding language, but it shows signs of lack of clarity regarding what exactly constitutes an airport city and an aerotropolis. It appears that researchers have a different interpretation of the concepts, or the concepts are not so clearly defined that the same airport can be classified differently by researchers. Therefore, to determine whether these terms were also used in airport planning documents, the 84 airports listed by Kasarda 2013 were analysed and shown in the following Section.

4.2. Displaying the 84 airports listed by Kasarda (2013)

The world regions presented by Kasarda were adapted according to the way the World Bank classifies countries by their income and displayed as shown in Figure 2. Kasarda and Lindsay (2011) mentioned that aerotropoli increased, particularly in Asia, and Figure 2 demonstrates their statement. Comparing his list and the World's Bank classification, it represents that there are at least one Operational and one Developing Aerotropolis in each region worldwide. This comparison also shows that, according to Kasarda's classification, aerotropoli are located predominantly in areas from lower-middle and upper-middle-income groups: East Asia & Pacific (EAP), Latin America & Caribbean (LAC), South Asia (SAS), and Sub-Saharan Africa (SSA). Although the airport in Campinas, Brazil, is shown in Figure 2 and was mentioned by the academic literature, it was not mentioned in Kasarda's list (2013). Figure 2 still presents that the airport city is located mainly in Europe & Central Asia (ECA) (Table 10). It shows that airport cities were concentrated in countries that belong to the high-income group, according to the World Bank's classification.

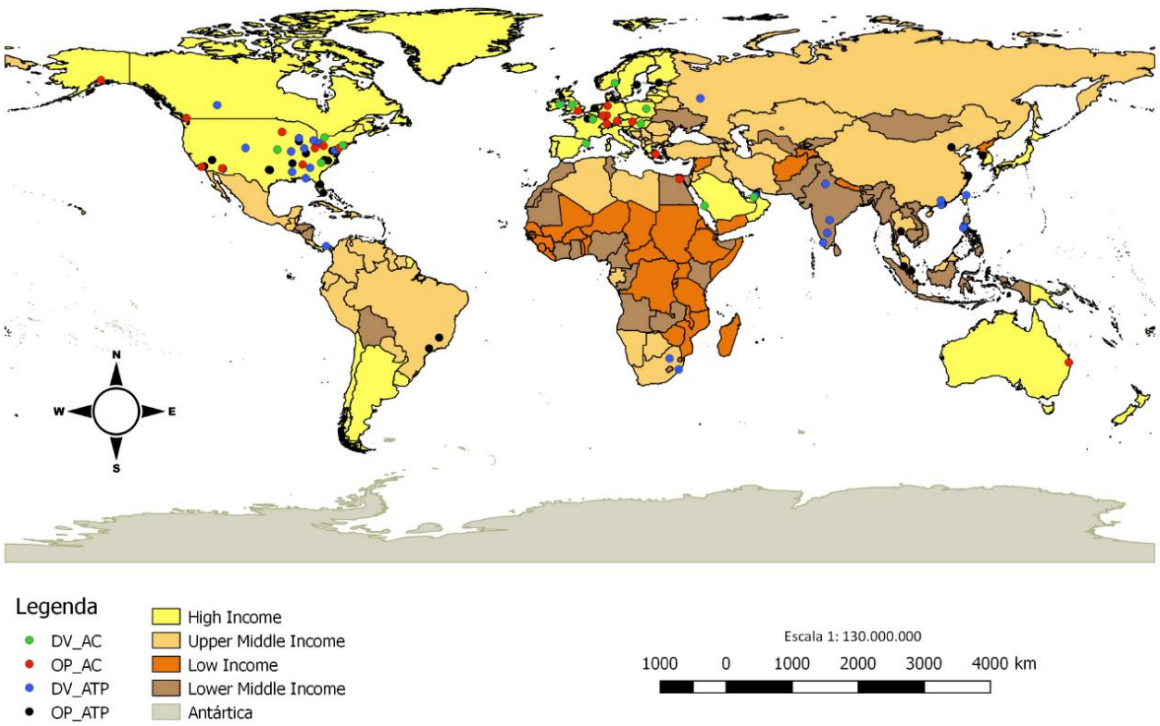


Figure 2 Developing and Operational airport cities and aerotropoli classified by income groups
Source: adapted – World Bank income group classification and Kasarda (2013)

Table 6 Classification, number, and location of airports for each ADD concepts, according to the 84 airports listed by Kasarda, 2013

Classification and number of each ADD concepts	Location
Operational airport city (number of 20) Developing airport city (number of 13)	The DV_AC and OP_AC were primarily located in the regions such as North America (NAM), Europe & Central Asia (ECA), the Middle East & North Africa (MENA), and East Asia & Pacific (EAP).
Operational aerotropolis (number of 25) Developing aerotropolis (number of 26)	The DV_ATP and OP_ATP were located mainly in North America (NAM) and East Asia & Pacific (EAP). They were also situated in regions such as Latin America & the Caribbean (LAC), North Africa (MENA), South Asia (SAS), and Sub-Saharan Africa (SSA).

Source: adapted - Available at: http://aerotropolis.com/airportcity/wp-content/uploads/2018/11/2013_AerotropolisStatus.pdf. Access in: 23Sep2020.

5. Comparison of academic definitions and examples with industry usage, as found on airport websites and in airport planning documents

This Section contrasts industry usage of the ADD concepts with descriptions in the academic literature by analysing the presence or absence of the terms on websites and planning documents (Tables 11 to 17). Comparing the industry examples of ADD concepts between researchers and the 84 airports listed by Kasarda (2013) showed some differences. The examples of Airport cities and aerotropoli mentioned in academic literature showed the main airports located in Hong Kong, Singapore, Incheon, Paris, Amsterdam, Memphis and Dallas (Section 3) were categorised as aerotropoli, particularly in operation. This differs to a certain extent from the examples of academic literature which some of them were also classified as airport cities, and several of them were not even mentioned in academic literature (e.g. Miami International Airport and Edmonton International Airport).

By answering Q1, it was found that not all ADD concepts were mentioned on the airport websites and in planning documents, particularly the airport city and aerotropolis terms which were expecting to find out due to the classification of the airports in academic literature. Tables (11 to 16) also show other names that were used to refer to ADD, such as Aeropolis, Aviapolis, Dublin Central Airport, Cairo Airport City, and Abu Dhabi Airport Business City. At first glance, without analysing the main content of the terms, this variety of terminology indicates that airports are adopting a similar idea of the concept but about their brand. It, therefore, seems to be a marketing strategy to make the name of the airport stand out.

On some occasions, subsidiary sponsors or investor's website mentioned the ADD terms (e.g. Zurich, Oslo, and Panama - locations referencing the airports). It indicates that some airport plans are made not only by airports but also by investors or local and state governments. These different stakeholders do not always use the same terminology. The same occurred with a few airports

with a second master plan or blueprinted to describe the AC and ATP terms (e.g. Atlanta, and Memphis - locations referencing the airports). The publication year of the available documents, generally speaking, demonstrates that the AC and ATP terms are used on the airport website and in other types of planning documents. This is an evidence that the AC and ATP terms are not obsolete and are still a current trend of the airport-driven development strategy.

By answering Q2, it was found that it is possible to identify some divergence in the way an airport is framed by Kasarda, by the airport website, master plans, and other academic literature. For example, Table 11 presents the EAP Region. Incheon (South Korea) is classified by Kasarda as an aerotropolis but as an airport city on the website and in the airport brochure. Kasarda classifies Sepang (Malaysia) as an aerotropolis but as an Aeropolis on its website, brochure and master plan. It appears the term Aeropolis is used for marketing purposes as a brand name. Hong Kong has a separate "SkyCity" website and uses the term airport city on its presentation page. This differs from Kasarda's classification of Hong Kong airport as an aerotropolis. Taoyuan is the only city where the aerotropolis term was used on the airport website, planning documents and Kasarda's classification table. It suggests the aerotropolis concept has been embraced by the airport planners and implemented as a strategy for the development of this region.

Table 7 Comparison between Kasarda's classification, the term used on the airport website, and the term used in the planning documents - EAP Region

Country	Location reference	Kasarda's classification	Used term -Airport website	Used term - Planning Document	Type of analysed document	Year of publication
Australia	Brisbane	Airport City	Not applicable	Not mentioned	Master plan	2014
China	Guangzhou	Aerotropolis	Not applicable	Not mentioned	Webpage	2010
	Hong Kong	Aerotropolis	Skycity	Skycity	Master plan	2016
Malaysia	Sepang	Aerotropolis	Aeropolis	Aeropolis	Brochure	No reference
					Master plan	2016
Philippine	Manila	Aerotropolis	Not applicable	Not mentioned	Webpage	2018
South Korea	Incheon	Aerotropolis	Airport City	Airport City	Brochure	2012
Taiwan	Taoyuan	Aerotropolis	Aerotropolis	Aerotropolis	Presentation	2014

Table 12 shows the ECA Region. The location reference, Amsterdam, is classified on the airport website and in the airport's strategic plan as an airport city. Amsterdam is one of the airports which mentions clearly AirportCity as their business model. They also show the evolution of it, presenting AirportCity 3.0. Whilst Frankfurt and Munich are classified as airport city, the same classification as Kasarda presents. The United Kingdom airports mention the AC in their documents, Manchester in the brochure, and London in the airport master plan. Germany, Norway, and United Kingdom were the countries in which the terms used by the airports were the same as used by Kasarda. Zurich is not mentioned in table 12 because it was found in an annual report which is not considered in this study. However, a specific website displays a similar strategy as the airport city, named The Circle.

Table 8 Comparison between Kasarda's classification, the term used on the airport website, and the term used in the planning documents - ECA Region

Country	Location reference	Kasarda's classification	Used term – Airport website	Used term - Planning Document	Type of analysed document	Year of publication
Finland	Helsinki	Aerotropolis	Aviapolis	Aviapolis	Webpage	2015
			Not applicable	Aviapolis/Airport city	Master plan	2014
France	Paris	Aerotropolis	Not applicable	Airport city	Strategic plan	2016
Germany	Frankfurt	Airport City	Airport city	Airport city	Brochure	2015
	Munich	Airport City	Airport city	Airport city	Webpage	2018
Ireland	Dublin	Airport City	Dublin Airport Central	Dublin Airport Central	Brochure	2018
					Master plan	2016
Netherlands	Amsterdam	Aerotropolis	Airport city	AirportCity	Strategic plan	2015
Norway	Oslo	Airport City	Airport city	Airport city	Webpage	2018
				Not mentioned	Master plan	2012
Sweden	Stockholm	Aerotropolis	Skycity	Airport city/SkyCity	Webpage	2018

United Kingdom	Manchester	Airport City	Airport city	Airport city	Brochure	2016
				Not mentioned	Master plan	2016
	London Heathrow	Airport City	Not applicable	Airport city	Master plan	2014

Table 13 displays two airports from the LAC Region: Belo Horizonte is located in South America and Panama in Central America. The airport city and aerotropolis terms were clearly mentioned on the Belo Horizonte airport website. They refer to the airport city and aerotropolis terms because they consider the airport "will be the first airport in the country to operate the concept of an airport city. Its surroundings will become the first aerotropolis in South America[†]." Similar way expressed in the academic literature regarding the AC and ATP concepts. The airport city and aerotropolis terms were not clearly mentioned on the Panama airport website. Only the airport city term was mentioned in an airport presentation, and in the 2016 and 2017 annual reports elaborated by the airport with not many details. However, for this study, the annual report was not considered for analysis. On the other hand, a specific website called Panatropolis refers to the new planned built city integrated into the airport in Panama, located 15 minutes driving from Panama City.

Table 9 Comparison between Kasarda's classification, the term used on the airport website, and the term used in the planning documents - LAC Region

Country	Location reference	Kasarda's classification	Used term - Airport website	Used term - Planning Document	Type of analysed document	Year of publication
Brazil	Belo Horizonte	Aerotropolis	Aerotropolis	Airport city & aerotropolis	Master plan	2011
					Webpage	2014
Panama	Panama City	Aerotropolis	Not applicable	Airport city	Presentation	2016
			Panatropolis	Aerotropolis	Webpage	2018

Table 14 displays the airports from the NAM Region. Most airport websites do not mention the AC or ATP terms. Only Edmonton, in Canada, and Atlanta, Denver and Memphis, in the United States, have cited the AC or/and ATP on the website. Atlanta has not mentioned any term in its master plan, but a specific and detailed document (blueprint) particular to the airport city and aerotropolis concepts. Charlotte has published a particular concept, "Airport Commercial Development Strategy", and its Kasarda's classification is AC. It seems that planners wanted to frame their strategies differently but with a similar idea. Dallas/Fort-Worth does not clearly mention the ATP term on the website and in the airport strategic plan. Still, it is an example of ATP in the academic literature (Table 9) and classified by Kasarda (2013) as an Aerotropolis. It is essential to consider why Dallas does not at least mention this term in the strategic plan. It suggests that there is no embracement of the term into their master plans, or they do not want to refer to them as an aerotropolis. Cleveland and Memphis framed themselves as Kasarda did and had the ATP term mentioned in their master plans. Memphis frame itself as America's Aerotropolis. It shows that they have embraced the term.

Table 10 Comparison between Kasarda's classification, the term used on the airport website, and the term used in the planning documents - NAM Region

Country	Location reference	Kasarda's classification	Used term - Airport website	Used term - Planning Document	Type of analysed document	Year of publication
Canada	Edmonton	Aerotropolis	Airport city	Airport city	Strategic plan	2010
			Airport city & Aerotropolis	Not mentioned	Master plan	2011
	British Columbia	Airport City	Not applicable	Not mentioned	Master Plan	2008
	Hamilton	Airport City	Not applicable	Not mentioned	Master plan	2011
United States	Atlanta	Aerotropolis	Aerotropolis	Airport city & aerotropolis	Blueprint	2016
				Not mentioned	Master plan	2015
	Memphis	Aerotropolis	Aerotropolis	Aerotropolis	Strategic plan	2017
				Airport city & aerotropolis	Master plan	2014

[†] Available at : http://www.bh-airport.com.br/en/p/56/aerotropole.aspx .

Denver	Aerotropolis	Airport city	Airport city & aerotropolis	Presentation	2013
			Not mentioned	Master plan	2015
Cleveland	Aerotropolis	Not applicable	Aerotropolis	Master plan	No reference
Greensboro	Aerotropolis	Not applicable	Aerotropolis	Master plan	2010
Chicago	Aerotropolis	Aerotropolis	Not mentioned	Webpage	2004
Dallas/Fort-Worth	Aerotropolis	Not applicable	Not mentioned	Strategic plan	2012
Detroit	Aerotropolis	Not applicable	Not mentioned	Master plan	2017
LA/Ontario	Aerotropolis	Not applicable	Not mentioned	Strategic plan	2013
Lambert-St. Louis	Aerotropolis	Not applicable	Not mentioned	Strategic plan	2015
Louisville	Aerotropolis	Not applicable	Not mentioned	Master plan	2004
Milwaukee	Aerotropolis	Not applicable	Not mentioned	Master plan	2003
Morrisville	Aerotropolis	Not applicable	Not mentioned	Webpage	2018
Phoenix	Aerotropolis	Not applicable	Not mentioned	Master plan	2009
Orlando	Aerotropolis	Not applicable	South Airport Complex Concept	Webpage	2014
Charlotte	Airport City	Airport Commercial Development Strategy	Not mentioned	Master plan	2016
Anchorage	Airport City	Not applicable	Not mentioned	Master plan	2014
Los Angeles	Airport City	Not applicable	Not mentioned	Presentation	2016
Minneapolis-Saint Paul	Airport City	Not applicable	Not mentioned	Webpage	2010
Newark	Airport City	Not applicable	Not mentioned	Master plan	2012

Regarding the SAS Region, although the academic literature shows two airports, only one airport was cited in Kasarda's list (Table 15). The master plan was not found, but the airport city term is clearly mentioned on the Bengaluru airport website. It shows that they have embraced the airport city term. The airport from this region is classified by Kasarda as a developing aerotropolis.

Table 11 Comparison between Kasarda's classification, the term used on the airport website, and the term used in the planning documents - SAS Region

Country	Location reference	Kasarda's classification	Used term – Airport website	Used term – Planning Document	Type of analysed document	Year of publication
India	Bengaluru	Aerotropolis	Airport city	Airport city	Webpage	2017

Table 16 shows airports from the MENA Region. It shows that Cairo has used its location with the term airport city (Cairo Airport City). Similarly, Abu Dhabi, as an Abu Dhabi Airport Business City. For the location Jeddah, the term airport city was in their planning document, and it was classified as an airport city. Whilst, Dubai was classified as an aerotropolis, but it was not mentioned on their website or in their masterplan.

Table 12 Comparison between Kasarda's classification, the term used on the airport website, and the term used in the planning documents - MENA Region

Country	Location reference	Kasarda's classification	Used term – Airport website	Used term - Planning Document	Type of analysed document	Year of publication
Egypt	Cairo	Airport City	Cairo Airport City	Airport city	Webpage	2018
Saudi Arabia	Jeddah	Airport City	Not applicable	Airport city	Webpage	2018
United Arab Emirates	Dubai	Aerotropolis	Not applicable	Not mentioned	Master plan	2016
	Abu Dhabi	Airport City	Abu Dhabi Airport Business City	Abu Dhabi Airport Business City	Webpage	2018

Based on these findings, the airport master plans review confirms that the airport city term is the most frequently mentioned in the ECA and MENA regions. The airport city and aerotropolis are mostly mentioned together in the NAM and LAC regions. Whilst in the EAP region was expected to identify the term aerotropolis as one of the most frequent in the master plans because of the number of airports examples of aerotropolis according to Figure 2.

6. Aspects of the transferability of the ADD concepts (from one region to another and from the academic literature to the industry and vice-versa)

When divided the airport's locations into these diagrams (Table 17), it was possible to identify that the airport city was used in the master plans more often interchangeably with other particular words such as Aviapolis or SkyCity. Differently from the airport city and aerotropolis terms, planners used only airport city, only aerotropolis or airport city & aerotropolis together. It seems they do not use them interchangeably as few researchers did. When airport planners used airport city & aerotropolis seemed to reflect Kasarda (2019) and Ashford (2011)´s understanding of the AC and ATP: the airport city is the core of an aerotropolis. Separated but complementary entities.

Table 13 Terms used in airport master plans and/or airport websites, by location of the airports

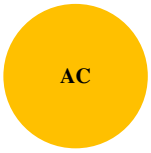
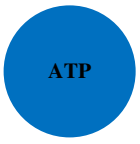
Terms used in airport master plans and/or airport websites	Terms represented by the diagram	Location of the airports
Airport city		**East Asia & Pacific** Incheon **Europe** Amsterdam Dublin Frankfurt London Munich Paris **North America** Edmonton **Middle-East** Cairo Airport City Jeddah **South Asia** India
“Airport City or Aviapolis (AV)”; “Airport City or Skycity (SKC)”		**Europe** Helsinki (AC/Aviapolis) Sweden (AC/SkyCity) **Middle-East** Abu Dhabi Airport Business City
Aerotropolis		**East Asia & Pacific** Tayoan **North America** Cleveland Greensboro **Latin America & Caribbean** Panama (Panatropolis)
Airport city & Aerotropolis		**North America** Atlanta Denver Memphis **Latin America & Caribbean** Belo Horizonte

Table 17 also shows similarities regarding the term usage in regions with proximity, such as North America and Latin America & The Caribbean, particularly the United States and Brazil, and between European countries. It can be inferred that this reflects "regional" influences, and similar regions have the same understanding of the terms, or they use the analogous term to represent similar strategies in the proximity region. If we think about the transferability of the airport city and aerotropolis concepts

worldwide, looking at Table 17, it would be easier for city and airport planners to identify which ADD model they could choose based on the region.

7. Conclusions

The aims of this paper were to (1) to compare definitions of the airport-driven development concepts in the academic literature, (2) compare definitions with real-life examples given by researchers; (3) compare academic definitions and examples with industry usage, as found on airport websites and in airport planning documents; and (4) to find out aspects of the transferability of the ADD concepts, from one region to another and from the academic literature to the industry and vice-versa. Regarding the comparison of airport-driven development concepts (ADD) definitions in academic literature, although several authors see the trend of airports as a centrality for a region, and some authors differentiate the ADD concepts geographically, this paper found that the ADD concepts sometimes are mentioned differently. Sometimes they are mentioned as an evolution of the airport and region. Sometimes researchers define the airport city as the core of the aerotropolis, suggesting they are different entities but complementary entities. Sometimes researchers use only one concept, and sometimes the terms are used interchangeably. It indicates that the ADD concepts still are dependent on the author´s interpretation.

Concerning comparing the ADD definitions with real-life examples given by researchers, it was also possible to see some differences. By searching for airports mentioned as examples of the ADD concepts, this paper identified that some airports referenced here as the main airports of the cities Amsterdam, Dallas, Dubai and Memphis were classified differently among researchers. This was because sometimes the same airport was identified as an aerotropolis, sometimes as airport cities and sometimes as an airport corridor.

Respecting the comparison of the ADD academic definitions and examples with industry usage, as found on airport websites and airport planning documents, this paper found different use of the terms between academic literature and airport master plans. As examples of these findings are Dallas, Incheon, Amsterdam, and Hong Kong. Perhaps researchers are using different terms to refer to the same thing, or they have a different interpretation of the ADD concepts from airport planners and vice-versa.

This paper showed that the airport city, aerotropolis, aviapolis, and skycity are presented in various airport documents and on the airport websites. These findings could be considered as substantial proof regarding the incorporation of the ADD concepts into their plans. However, this paper found that not all airports use a specific ADD concept on their websites and airport master plans. A particular term, particularly airport city and aerotropolis, would be used because several were examples of some ADD concept in academic literature. It suggests that planners have not embraced the terms. Hence they are not a genuine part of their plans, or specific terms are only used by researchers, not yet in the industry; planners do not use them as part of the marketing strategy. However, it is premature to confirm this inference since the idea of the terms can be hidden and mentioned in other words. The main reasons for using the terms are generally not evident in documents. Further studies need to be done to understand better the decisions behind the use or lack of specific ADD terms.

Still, respecting the comparison of the ADD academic definitions and examples with industry usage, interchangeably exists. Table 9 displays that airports frame themselves as only AC, others as the only ATP, others as AC being the core of the ATP, and others as the same term, this latter meaning interchangeably usage. However, these findings show that airport planners use the airport city term interchangeably with skycity, aviapolis, and airport development zone than with the aerotropolis concept. It suggests that the airport city and aerotropolis terms are not used interchangeably by the airport planners, as this paper found in academic literature. Furthermore, this paper found that the airport city concept was used with the region's name or the airport (e.g. Abu Dhabi Airport Business City and Cairo Airport City). It suggests that these terms are used according to the airport planners' convenience and that this phenomenon is based on marketing strategies, as mentioned (Freestone and Baker, 2011; Peneda et al., 2011)

This article showed different expectations regarding the usage of the ADD concepts in particular location and similarities in the usage of ADD concepts in the industry by region when concepts travel from one area to another. The transferability of the aerotropolis concept from North America towards the East Asia and Pacific (EAP) region, particularly in China. Hence, it was expected to have the most frequent aerotropolis term usage in the master plans available in English, but it came out differently. From the EAP region, the airport from Tayoan was the same concept mentioned by researchers, airport planning documents, and website. It suggests that the planning documents contain ideas of the aerotropolis concept, and this is sold and internalized by planners, and it becomes a reference for researchers to write about.

This work made visible that in the industry, the term airport city was most frequently mentioned in Europe and Central Asia (ECA) and the Middle East and North Africa (MENA) regions in airport documents/websites. It suggests that there was not much interference of the transferability from North America towards these regions. Whereas it was possible to identify similarities where the concepts of airport city and aerotropolis were mentioned as complementary terms by airports in North America (NAM) and Latin America and the Caribbean (LAC), as noted by Kasarda 2019. This suggests the effects of the transferability from the Global North to the Global South.

Finally, this paper identified that the lack of consensus of the terminology usage in academic literature appears not to negatively impact the transferability of the concepts in the industry. Although the interchangeable usage was seen in academic literature, it has not seen in the industry. It may indicate that there are not many interferences of the academic literature to the industry. For several airports, when the airport city concept was mentioned in planning documents and on airport websites, this was the only

concept. It happened for some airports that mentioned only the aerotropolis concept and for those which mentioned the airport city and aerotropolis in the same document. Hence, the airport city and aerotropolis concepts were used in planning documents following a specific idea of each concept without mixing them. This highlights that city and airport planners may follow ideas from their closer regions or countries or investments are based on a particular concept strategically, particularly countries from the upper middle income (e.g. Brazil and China) with influences from North America. Future research would involve further investigation into these main findings.

At last, this paper has some limitations in obtaining data from the airport websites because not all of them make their planning documents available online. Moreover, miscellaneous papers and languages could provide a different interpretation of the ADD concepts. Future research would involve further investigation, particularly with empirical studies, to check why airport planners choose a specific concept instead of another or why planners choose not to use a particular idea. Additionally, to identify whether a specific usage of the ADD concept would make a difference in the businesses it was supposed to make for the region, particularly quantitative aspects (number of cargo and passengers' movement and surrounding enterprises). Lastly, to study whether a lack of definitional clarity has led to suboptimal planning outcomes in terms of quantitative aspects and to make correlations between the size of airports and their classification.

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APPENDIX

Table 14 Airport city definitions, according to academic literature and its main points

Authors	Airport city definitions	Main points
(Güller and Güller, 2001)	"The airport city is the more or less **dense cluster of operational, airport-related activities**, plus other **commercial and business concerns**, **on and around the airport platform**."	A dense cluster of operational, airport-related activities
		Commercial and business concerns
		On and around the airport platform
(Peneda et al., 2011)	"This concept encompasses **multiple dimensions** related to the **different perspectives** of the actors involved in its development: • it is a **business model** of airport-centred real estate development; • it is a **marketing and branding tool** to promote the attractiveness of the airport area for the location of companies and businesses; and • it is also the **spatial form**, manifested by the creation of working, shopping, meeting, and leisure spaces due to the development of **multifunctional business clusters taking place at and around the airport**."	Business model
		Marketing and branding tool
		Spatial form: multifunctional business clusters taking place at and around the airport
(Ashford et al., 2011)	"airport city is the **core of the aerotropolis**."	The core of the aerotropolis
(Appold, 2015)	"airport cities are **suburban employment agglomerations anchored by an airport**".	Employment

(Jan Armin, 2015)	"The built environment of several international airports does not anymore just include facilities for logistical purposes. Instead, **several utilisations** are typical for city centres, such as offices, shopping venues or conference centres. This has evoked the image of an airport city. […] an Airport City is supposed to consist of **the airport platform with its terminals and adjacent sites**, **which are functionally and organisationally closely connected with the airport**."	Several utilisations (offices, shopping venues or conference centres) The airport platform with its terminals and adjacent sites
(Mokhele, 2018a)	"Airport city is associated with the **growth of economic activities around airports** because of their dependence upon airports (see Conway 1993; Kasarda 2009; Walker & Stevens 2008) […]."	Economic activities
(Drljača et al., 2019)	"Researching the AC phenomenon needs to be seen in context. This phenomenon has an internal and external context. Its internal context is made up of an airport (runway, passenger terminal, etc.) and other AC facilities such as hotels, congress centres, business premises, gas stations, recreational facilities, health facilities, shopping centres, parking lots, Cargo Centre and others. Its external context is made up of Aerotropolis (Kasarda, 2008) and the national and global framework since the air traffic sector is a global activity."	Internal context = airport city; external context = aerotropolis
(Setiawan et al., 2020)	"The development of the airport city, integrated commercial property, and the land, produces non-aeronautical income from tourists, business people, and cargo."	Integrated commercial property
(Ventura et al., 2020)	"Airport City (McKinley Conway, 1980) describes for the first time a close relationship between commercial development and airport, both within the building and in its surroundings, such as to involve non-aeronautical structures: logistics, services, office parks, commercial complexes and residential airparks."	Relationship between commercial development and airport
(Wach-Kloskowska, 2020)	"**The airport city may be the centre of a larger area around the airport, sometimes defined as an aerotropolis**, especially in the USA, which means a vast urban form that is in some respects similar to a metropolis formed around an airport, which is the main driver of development for both the airport city and the aerotropolis. Business parks, technology parks and modern industrial and logistics centres are established within the aerotropolis, where companies related to air transport service are located first, then companies for which quick and efficient access to suppliers, customers or business partners possible only with the use of air transport is of key importance. Shopping centres, hotels and theme parks are also often built near airports."	Centre of a larger area around the airport, sometimes defined as an aerotropolis
(Kim, 2010)	"The Airport City theory suggests to develop the industries related to air transport by building complexes around airports, in which integrated logistics, commerce and business, leisure entertainment, and manufacturing locate (Conway, 1993)."	To develop the industries related to air transport by building complexes around airports

Table 15 Aviapolis definitions, according to academic literature and its main points

Authors	Aviapolis definitions	Main points
(Stevens et al., 2010)	"The development of the aviapolis is the **strategic reorganisation of an existing urban area into an aviation orientated business hub**, utilising the anchors which exist within the region and maximising their potential. A limitation may be the continued requirements of investment and international marketing, yet the aviapolis still provides one model for the integrated planning and development of an airport and its immediate hinterland functioning as a major mixed-use activity centre."	Strategic reorganisation of an existing urban area into an aviation orientated business hub

(Ventura et al., 2020).	It was “born from an initiative of the Finnish government, consists in the strategic reorganisation of an existing urban area, subsequently transformed into a Global Business District, full of commercial, recreational and residential activities (it is home to around 18,000 inhabitants) […]”.	Strategic reorganisation of an existing urban area

Table 16 Definition of the aerotropolis concept according to academic literature and its main points

Reference	The aerotropolis concept	Main points
(Keast et al., 2008)	"This transformation of the function and orientation of airports has been termed the **aerotropolis or airport metropolis**, where the **airport is recognised as an economic centre with land uses** that **link-local and global markets**."	Transformation of the function and orientation of airports Economic centre
(Stevens et al., 2010)	"The aerotropolis is an **urban form with an aviation focus**, **centred on multimodal logistics where low weight/high-value goods** can be **moved quickly and efficiently**. Companies are able to maintain zero inventories: take customer orders, fly in raw materials, assemble and distribute them all at the one airport location (Kasarda, 1991b). The ruling philosophy is '**survival of the fastest**' (Kasarda, 2000)."	Urban form (aviation focus)
(Alkaabi and Debbage, 2011)	"**The concept of the airport city or** what Kasarda (2008) has coined **'aerotropolis'** is based on the notion that **some airports are now shaping business locations** and **urban development** in ways in which highways, rail and seaports did in the past (Al Chalabi and Kasarda, 2004; Leinbach, 2004)."	Urban development
(Freestone and Baker, 2011)	"The aerotropolis consists of a **core "airport city" at the epicentre of a wider metropolis** and **interconnected by dedicated motorways** "aerolanes") and **high-speed rail links** ("aerotrains") with **outlying aviation-oriented business precincts such as e-commerce fulfilment centres**, **business and logistic parks**, **retail complexes, hotels, and free trade zones**. This outsized footprint picks up **time-sensitive goods-processing and distribution facilities**, especially those involved in high shipping value to weight products, firms dependent on frequent business travel, and other opportunistic economic activity. ***The aerotropolis label has been applied flexibly*** **to a diversity of environments, planned, and unplanned**."	Airport city is the core of aerotropolis -Wider metropolis
(Peneda et al., 2011)	"The concept of the aerotropolis was introduced through the work of Kasarda (30). The aerotropolis (also known as the airport economic region) **describes the collection of all airport-related developments** that appear **around airports** (20). It is **an area that centres its economy on the airport**, which in turn **serves as the community's economic engine**, and is analogous in shape to the traditional **metropolis made up of a central city** and **outlying corridors and clusters of aviation-oriented businesses** and their **associated mixed-use residential developments**. Kasarda's aerotropolis concept is a logistics-based model of airport city outward development (30–33). **It arises as a new urban form**, with a **multimodal commercial core (the airport city)**, which anchors a more extensive mix of warehousing precincts, e-fulfilment centres, industrial and office parks, free trade zones, hotels, and entertainment districts. The only **non-commercial land use consists of residential districts located between the motorways and away from the main flight paths**."	Developments around airports Airport centre of the area economy New urban form

Reference	The aerotropolis concept	Main points
(Ashford et al., 2011)	"**Clusters of aviation-linked businesses radiating** outward up to **20 km or more deep into the metropolitan area along and near airport access** corridors **forming the greater airport region**."	Clusters of aviation-linked businesses radiating 20 km or more into metropolitan area
(Antipova and Ozdenerol, 2013)	"**New phenomenon of an aerotropolis** broadly understood as **a growing employment concentration** where airports are playing the **critical role with the cities** and **supporting industries growing around them** as exemplified in medium-sized Memphis, TN."	New phenomenon Employment concentration growth Industries around the airport
(Stevens and Baker, 2013)	"**The Aerotropolis defines the airport** as the organising centre of an **urban core that connects global cities** with **same day service and trade corridors**. The **centre of the city—the Airport City**—is **connected by high-speed corridors** (aerolanes) that **link aviation-based business** precincts, **free trade zones and logistics parks**. **This vision of the airport** sees it as a transaction space for the global economy that connects economic hubs and trade zones."	The airport as a centre of an urban core Airport city is the centre of the city Responsiveness Aviation-based business precincts, free trade zones and logistics parks
(Yeo et al., 2013)	"The aerotropolis is a **new form of airport-centric commercial development** in which the **layout, infrastructure, and economy are centred on a gateway airport**, and it is **positioned as a twenty-first-century driver of business location**, **urban economic growth**, and **global economic integration**."	New form of airport-centric commercial development Layout, infrastructure Economy Urban economic growth
(Cidell, 2015, p. 1126)	"Airports are therefore taken for granted as regional and local job generators, with the **'airport city' or 'aerotropolis' concept** being developed in academic and policy circles **to describe and promote the airport sub region** as **a new kind of urban place based on the number of jobs** found **within proximity to the airport** (Kasarda and Lindsay, 2011; Appold and Kasarda, 2013; GAO, 2013)."	To describe and promote the airport sub region A new kind of urban place based on the number of jobs Within proximity to the airport
(Kasarda, 2019, p. 1)	"The aerotropolis is a **new urban form that relies on an airport** and **its integrated surface transportation infrastructure** to speedily connect high-value, time-sensitive firms to their distant suppliers, customers, and enterprise partners. It consists of a **multimodal airport-based commercial core (Airport City)** and **outlying corridors and clusters of aviation-linked businesses** and associated mixed-use commercial/residential developments that feed off of each other and their accessibility to the airport."	New urban form Multimodal airport-based commercial core (Airport City) Outlying corridors and clusters of aviation-linked businesses
(Mokhele, 2018b, p. 1)	"[…] and as more firms are pulled towards airport cities, **the urban form of aerotropolis emerges**, consisting of **developments that could extend up to 30 km from airports** (e.g. Kasarda 2009; Kasarda & Lindsay 2011)."	Urban form 30 km from airports

Reference	The aerotropolis concept	Main points
(Hubbard et al., 2019)	"The aerotropolis model **centers on the airport as the economic catalyst to stimulate the local economy** (Kasarda and Appold, 2014). […]." "**The aerotropolis is an urban region** in which **the airport is the focal point of the economy** (Kasarda and Appold, 2014). The word aerotropolis originates from the Greek words "aero" meaning "air" and "polis" meaning city (Robertson, 1991). […]"	The airport as the economic catalyst to stimulate the local economy Urban region
(Drljača et al., 2019)	"Already today is contemplated about the new future content of AC, which is an airfield for aircraft flying to orbit Earth (Airport World, 2016, pp. 58-59) Aerotropolis is a new urban form characterised by cities built around the airport, well-connected, which enable good co-operation between suppliers, manufacturers, distributors and business people with remote customers and service users and markets."	New urban form characterised by cities built around the airport
(Kadarisman, 2019)	"Aerotropolis in the context is defined as the concept of city or regional planning with management, infrastructures, and economy centering in an airport." "Aerotropolis is a modification of Aerocity (Norman, 2011), in which Aerocity covers a city, whereas Aerotropolis refers to a region. This implies that the area of the Aerotropolis is greater than that of an Aerocity."	Aerotropolis refers to a region
(Ofuebe and Paul, 2019)	"The Aviation Roadmap is a strategy that inculcates a comprehensive focus on aviation operating and funding model, re-designing of airports (General Aviation, Cargo, International, and Domestic Terminals) with emphasis on location, economy and opportunities, "aerotropolis concept", route marketing and the creation of special economic zones. It emphasised on the policy, legal, and enabling environment creation roles of the government in civil aviation."	Route marketing Special economic zones
(Syafarudin and Mulyana, 2019)	“Aerotropolis is a city airport development concept, or commonly called “Airport City.” The concept of aerotropolis is a new concept in the world transport industry where the Airport has shifted from transportation center to a multifunctional aero metropolis.”	Airport as a multifunctional aero metropolis
(Cunha et al., 2020)	"In large cities and cities in which the metropolitan area has a percentage of **its infrastructure and economy centred around an airport** (aerotropolis) [1], a large percentage of the population travels the streets."	Its infrastructure and economy centred around an airport
(Sun and Ma, 2020)	"[…] Aerotropolis, which may be defined as an urban economic district whose infrastructure, land use,and economy are centred on a major airport." "The Aerotropolis emerges where air travellers work, shop, meet, exchange knowledge, conduct business, eat, sleep, and are entertained, **often without going more than 15 minutes from the airport** (see Figure 1). A new, dynamic urban growth pole forms, with multimodal infrastructure (air, highway, rail, and links to ports), commercial, residential aspects, and business site planning, all these factors can be synergised to create a new urban form that is economically efficient, globally competitive, attractive, and sustainable. Therefore, the degree of multi-model infrastructure, urban environment, and service efficiency are all important factors for the evaluation of a city and Aerotropolis." "An aerotropolis is a metropolitan subregion with an infrastructure centred an airport."	Urban environment Service efficiency Metropolitan subregion

Reference	The aerotropolis concept	Main points
(Ventura et al., 2020)	"The second and important model, Aerotropolis (Kasarda & Lindsay, 2011) (Kasarda, 1991) (Lindsay, 2008) **is a natural evolution of the previous one**, and describes a tertiary city, stretching up to 30 kilometres, with the airport in the centre. The Aerotropolis model emphasises the connectivity between airport and logistics activities: it consists of an airport core and extensive peripheral areas of aviation-oriented businesses and associated residential developments."	Emphasises the connectivity between airport and logistics activities
(Wach-Kloskowska, 2020)	"Thus, an aerotropolis is understood as a model for the further development of airport-related zones when new investments directly or indirectly related to the airport around the airport city appear. An aerotropolis consists of an airport complex, an airport city, transport corridors connecting them with the surroundings, and groups of buildings performing various functions located within a 30-km radius, such as companies related to the aviation industry, services for passengers and office complexes and even housing estates for airport employees or people who often fly planes."	Development of airport-related zones
(Wang et al., 2020)	"The Aerotropolis model points out that major airports have become key nodes in global production, and that by offering speed, agility, and connectivity, aviation-related businesses of all types have been attracted to their vicinities (Kasarda, 2000a,b, 2004). These include, among others, time-sensitive manufacturing and distribution facilities, such as aerospace, biopharma, electronics, and e-commerce; hotel, entertainment, retail, convention, trade and exhibition complexes; and office buildings that house air-travel intensive executives and professionals (Kasarda, 2006). As an increasing number of aviation-oriented businesses are being drawn to airport cities and along the transportation corridors radiating from airports, a new urban form is emerging — the Aerotropolis — stretching up to 20 miles (30 km) outward **from some airports** (Kasarda and Appold, 2014)."	Major airports have become key nodes in global production

Table 17 Terms used in the academic literature, by location reference and author

Region	**Country**	**Airport Name**	**Kasarda's classification**	**Academic literature**	**Author**
East Asia & Pacific	Australia	Brisbane Airport	Airport City	Aerotropolis or Airport Metropolis	Keast et al. (2008)
				Airport City	Freestone and Baker (2011)
	China	Beijing Capital International Airport	Aerotropolis	Aerotropolis	Díaz Olariaga (2015)
				Aerotropolis	Yeo et al. (2013)
		Hong Kong International Airport	Aerotropolis	Aerotropolis	Charles et al. (2007)
				Aerotropolis	Ikhsan Setiawan et al. (2020)
				Aerotropolis	Peneda et al. (2011)
				Aerotropolis	Rogerson (2018)
				Aerotropolis	Yeo et al. (2013)
				Airport City	Wang et al. (2011)
				Airport Core Program	McNeill (2014)
		Shanghai Pudong International Airport	Aerotropolis	Aerotropolis	Yeo et al. (2013)
	Malaysia	Kuala Lumpur International Airport	Aerotropolis	Aerotropolis	Charles et al. (2007)
				Aerotropolis	Díaz Olariaga (2015)
				Aerotropolis	Ikhsan Setiawan et al. (2020)
				Aerotropolis	Peneda et al. (2011)
	Singapore	Singapore Changi Airport	Aerotropolis	Aerotropolis	Berawi et al. (2018)
				Aerotropolis	Charles et al. (2007)

				Aerotropolis	Díaz Olariaga (2015)
				Aerotropolis	Oliveira et al. (2019)
				Aerotropolis	Peneda et al. (2011)
				Aerotropolis	Yangmin et al. (2021)
				Aerotropolis or airport metropolis	Liou et al. (2018)
				Aerotropolis or Airport City	Addie, J.-P.D. (2014)
				Airport City	Wang et al. (2011)
				Airport Core Program	McNeill (2014)
	South Korea	Incheon International Airport	Aerotropolis	Aerotropolis	Berawi et al. (2018)
				Aerotropolis	Charles et al. (2007)
				Aerotropolis	Díaz Olariaga (2015)
				Aerotropolis	Freestone and Baker (2011)
				Aerotropolis	González (2013)
				Aerotropolis	Ikhsan Setiawan et al. (2020)
				Aerotropolis	Kasarda (2017)
				Aerotropolis	Morefield and Strong (2012)
				Aerotropolis	Oliveira et al. (2019)
				Aerotropolis	Peneda et al. (2011)
				Aerotropolis	Rogerson (2018)
				Aerotropolis	Wang et al. (2013)
				Aerotropolis	Yeo et al. (2013)
				Aerotropolis or Airport City	Graham (2009)
				Airport City	Yun, J. (2015)
	Taiwan	Taiwan Taoyuan International Airport	Aerotropolis	Aerotropolis	Chuang et al. (2016)
				Aerotropolis	Wang et al. (2013)
				Aerotropolis	Yeo et al. (2013)
				Airport Core Program	McNeill (2014)
	Thailand	Bangkok Suvarnabhumi Airport	Aerotropolis	Aerotropolis	Díaz Olariaga (2015)
Europe & Central Asia	Finland	Helsinki-Vantaa Airport	Aerotropolis	Airport City or Aviapolis	Stevens et al. (2010)
				Airport City	Drljača et al. (2019)
	France	Paris Charles de Gaulle Airport	Aerotropolis	Aerotropolis	Rogerson (2018)
				Airport Corridor	González (2013)
	Germany	Frankfurt Airport	Airport City	Aerotropolis	Peneda et al. (2011)
				Aerotropolis or Airport City	Addie, J.-P.D. (2014)
				Airport City	Drljača et al. (2019)
				Airport City	Wach-Kloskowska, 2020
		Munich Aerotropolis	Airport City	Aerotropolis	Yangmin et al. (2021)
	Netherlands	Amsterdam Schiphol	Aerotropolis	Aerotropolis	Alkaabi and Debbage (2011)
				Aerotropolis	Berawi et al. (2018)
				Aerotropolis	Charles et al. (2007)
				Aerotropolis	Kasarda (2017)
				Aerotropolis	Peneda et al. (2011)
				Aerotropolis	Yangmin et al. (2021)
				Aerotropolis or airport metropolis	Liou et al. (2018)
				Aerotropolis or Airport City	Addie, J.-P.D. (2014)
				Airport City	Freestone and Baker (2011)
				Airport City	González (2013)
				Airport City	Wang et al. (2011)

				Airport Corridor	Stevens et al. (2010)
	Polony	Chopin Airport City	No classification	Airport City	Stangel (2019)
	Switzerland	Zurich Airport	Airport City	Airport City	Wach-Kloskowska, 2020
				Airport Corridor	Freestone and Baker (2011)
				Airport Corridor	González (2013)
	United Kingdom	Gatwick Airport	No classification	Airport City	Drljača et al. (2019)
		London Heathrow Airport	Airport City	Aerotropolis	Charles et al. (2007)
Latin America & Caribbean	Brazil	Belo Horizonte International Airport	Aerotropolis	Aerotropolis	Morefield and Strong (2012)
				Aerotropolis	Oliveira et al. (2019)
				Aerotropolis	Pereira et al. (2018)
				Aerotropolis or Airport City	Addie, J.-P.D. (2014)
		Viracopos International Airport, Brazil	No classification	Aerotropolis	Charles et al. (2007)
				Aerotropolis	Peneda et al. (2011)
	Panama	Tocumen International Airport/Panatropolis	Aerotropolis	Aerotropolis	Morefield and Strong (2012)
Middle East & North Africa	Egypt	Cairo International Airport	Airport City	Aerotropolis or Airport City	Addie, J.-P.D. (2014)
	United Arab Emirates	Dubai Al Maktoum International Airport	Aerotropolis	Aerotropolis	Díaz Olariaga (2015)
				Aerotropolis	Ikhsan Setiawan et al. (2020)
				Aerotropolis	Morefield and Strong (2012)
				Aerotropolis or Airport City	Graham (2009)
				Airport Core Program	McNeill (2014)
North America	United States	Chicago O'Hare International Airport	Aerotropolis	Aerotropolis	Antipova and Ozdenerol (2013)
				Aerotropolis	Peneda et al. (2011)
				Aerotropolis	Rogerson (2018)
		Dallas-Ft. Worth International Airport	Aerotropolis	Aerotropolis	Alkaabi and Debbage (2011)
				Aerotropolis	Antipova and Ozdenerol (2013)
				Aerotropolis	Charles et al. (2007)
				Aerotropolis	Freestone and Baker (2011)
				Aerotropolis	Kasarda (2017)
				Aerotropolis	Morefield and Strong (2012)
				Aerotropolis	Peneda et al. (2011)
				Aerotropolis	Rogerson (2018)
				Aerotropolis or airport metropolis	Liou et al. (2018)
				Airport City	Wang et al. (2011)
		Denver International Airport	Aerotropolis	Airea	Freestone and Baker (2011)
				Airea	González (2013)
		Detroit Metropolitan Wayne County Airport	Aerotropolis	Aerotropolis	Morefield and Strong (2012)
		Hartsfield-Jackson Atlanta International Airport	Aerotropolis	Aerotropolis	Banai (2017)
				Aerotropolis	Syafarudin and Mulyana (2019)
		Los Angeles International Airport	No classification	Aerotropolis	Berawi et al. (2018)
			Aerotropolis	Aerotropolis	Antipova and Ozdenerol (2013)
				Aerotropolis	Morefield and Strong (2012)

		Memphis International Airport		Aerotropolis	Oliveira et al. (2019)
				Aerotropolis	Rogerson (2018)
				Aerotropolis & Airport City	Banai (2017)
		Phoenix Sky Harbor International Airport	Airport City	Aerotropolis or Airport City	Addie, J.-P.D. (2014)
		Washington Dulles International Airport	Aerotropolis	Aerotropolis	Charles et al. (2007)
				Aerotropolis	Peneda et al. (2011)
				Aerotropolis	Rogerson (2018)
South Asia	India	Delhi Indira Gandhi International Airport	Aerotropolis	Aerotropolis	Peneda et al. (2011)
		Hyderabad Rajiv Gandhi International Airport	Aerotropolis	Aerotropolis	Peneda et al. (2011)
	Indonésia	Kertajati International Airport	No classification	Aerotropolis	Syafarudin and Mulyana (2019)
		New Yogyakarta International Airport	No classification	Aerotropolis	Kadarisman (2019)
Sub-Saharan Africa	South Africa	Durban Aerotropolis	No classification	Aerotropolis	Luthuli and Houghton (2019)
		O.R. Tambo International Airport	Aerotropolis	Aerotropolis	Herbert, C.W. and M.J. Murray (2015)

Source: (Addie, 2014; Banai, 2017; Berawi et al., 2018; Charles et al., 2007; Díaz Olariaga, 2015; França, 2014; Graham, 2009; Herbert and Murray, 2015; Kadarisman, 2019; Keast et al., 2008; Liou et al., 2016; Luthuli and Houghton, 2019; McNeill, 2014; Morefield and Strong, 2012; Oliveira et al., 2019; Pereira and Caetano, 2015; Pereira et al., 2018; Setiawan et al., 2020; Syafarudin and Mulyana, 2019; Yangmin et al., 2021; Yun, 2015)