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Airport Cities and the Aerotropolis: The Way Forward

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Airports, like many major transportation interchanges, have long attracted commercial development. This attraction has grown as air passenger and cargo traffic has increased and as cities have continued to expand outward towards, and sometimes around, airports.

Airport area growth is being shaped by (1) firms providing air transportation services, (2) firms which are frequent consumers of air transportation, (3) businesses which cater to the ancillary needs of air travelers and employees of the previous two types of firms, and (4) companies which may simply be searching for accommodating sites with good regional highway access. These various types of business activities create a ratcheting effect, accelerating airport area growth in a largely organic manner.

Now, however, a new land use and business model is emerging providing structure to and distilling value from the prior organic development experience at and surrounding many airports. The business case underlying the Airport City model recognizes that (1) passengers, service-sector businesses, and shippers have unmet needs, (2) those needs can be systematically addressed as these three primary airport area growth drivers continue to increase in size and economic importance, and, (3) critically, that airport operators and their enterprise partners can benefit financially by addressing those needs.

The Airport City model is therefore increasingly being incorporated into airport commercial and land-use plans to generate additional nonaeronautical revenues while serving 21st century air travelers, businesses, and shippers. The new model is almost universally used in the planning for greenfield airports, with Airport Cities at Hong Kong, Incheon, Kuala Lumpur and Dubai blossoming into full-blown Aerotropolises.

The spatial and functional core of the Airport City is the passenger terminal which has been likened to an urban central square. It operates as its multimodal commercial nexus offering a variety of specialized goods and services. Urban functions such as offices, hotels, and exhibition complexes evolve near the terminal, analogous to a metropolitan central business district surrounding the central square, creating a city-like environment at and immediately around the airport. As aviation-linked businesses cluster further outward, primarily along connecting transportation corridors, a more expansive Aerotropolis (airport-integrated urban economic region) takes shape. Let me describe the evolution of these new urban forms, beginning with the commercially diversifying terminal and then moving progressively outward to the airport city and then the greater aerotropolis.

The Evolving Terminal Enterprise

At the largest international airports, passenger terminals are morphing into luxury shopping malls and artistic and recreational venues as well as locations to exchange knowledge and conduct business. No longer restricted to magazine shops, food courts, and duty-free, they now contain gallerias and shopping streets featuring brand name boutiques, specialty retail, and upscale restaurants, along with live music, arts, entertainment and cultural attractions. International brands are being complemented by locally-themed merchandise and dining outlets.

Concierge-staffed business lounges and trade facilities are sprouting up in the terminals, as well as concourse-connected 4-and 5-star hotels.

Hong Kong International Airport, opened in 1998, is a good case in point. Its main terminal hosts a galleria (The Atrium) with more than 20 high-end designer clothing shops. The airport is also developing a gold exchange for international traders. In early 2010, HKIA premiered the world's largest terminal commercial lounge. This 15,000 sq. ft. full-service business center supports up to 300 users with wireless hotspots, workstations, printers, and meeting facilities along with large-screen TVs and advanced videoconferencing systems. When not working, business travelers can enjoy an all-day buffet and an ala carte menu along with such personal amenities as spa-type massages, barber services, and manicures. For overnight stays, the 1,171 room Regal Airport Hotel, the largest in Hong Kong, connects Terminals 1 and 2.

Singapore Changi Airport, opened in 1981, more recently introduced cinemas, fitness centers, and a tropical butterfly park, while Amsterdam Airport Schiphol, upgraded in the mid-1990s, is home to a lively casino and Rijksmuseum art gallery. These not only help reduce travelers' stress but also improve their "airport experience" which can be a determining factor for transfer passengers choosing an airline and its hub.

Other airports taking on new enterprise functions include Frankfurt Airport, a leader in terminal retail since 1972, which now has the world's largest airport clinic serving more than 36,000 patients yearly, and Dallas/Fort Worth (DFW) International, whose terminal-linked

Grand Hyatt Hotel serves as a fly-in virtual corporate headquarters for many U.S. businesses.¹

Beijing Capital Airport's tenants include banks. Stockholm-Arlanda Airport's chapel conducted nearly 500 weddings in 2009.



The Grand Hyatt at Dallas Fort Worth International Airport serves as a virtual corporate headquarters for business executives.

The economic influence of airports is far greater than that of prior era transit-oriented development, such as projects near downtown train stations. An increasing number of airports employ more than 50,000 workers, which would qualify them as metropolitan central cities by the U.S. Census Bureau definition. When the hundreds of thousands of daily flyers are added—

¹ Byrnes, Nanette. "Home is Where The Airport Is." *BusinessWeek*, Issue 4047, August 2007, Pp. 89-92.

plus those greeting passengers—the consumer populations of many gateway airports are larger than most medium-sized cities. For example, more than twice as many people pass through Atlanta’s Hartsfield-Jackson International Airport terminal each year—some 90 million in 2008—as visited U.S. tourist meccas Disney World, Graceland (the former home of Elvis Presley), and the Grand Canyon, combined.

Given the significantly higher incomes of air passengers, which typically are two to four times the national average, and their often massive numbers—30 million to 90 million people visit large airports each year, compared with 8 million to 12 million for a large shopping mall—it is not surprising that major airport retail sales per square foot are up to six times greater than those for shopping malls and downtown shops. Terminal-based stores at major U.S. airports in 2007 generated sales from just under \$6,500 per sq m to over \$27,000 per sq m, according to *Airport Revenue News*. This compares with \$4,800 per sq m for nonanchor tenants in the average U.S. mall that same year, according to the International Council of Shopping Centers. New York’s Kennedy Airport was tops in the U.S. in concessions revenue in 2008 with US\$ 442 million, up from US\$ 405 million sales in 2007, despite the economic recession and air traffic declines.

Some airports in Asia and the Middle East substantially trump U.S. hub airport commercial revenues. South Korea’s Incheon International Airport, for example, had over US\$1 billion in retail revenues in 2008. Despite a small downturn in 2009, Incheon projects nearly US\$3 billion in sales by 2017. Dubai International’s billion-dollar-plus terminal-generated retail sales have been growing in excess of 20 percent annually in recent years.



Purchasing everything from powdered milk to Rolex watches, passengers inside Dubai International Airport generated more than US\$1.1 billion in retail sales in 2008, up by 23 percent from 2007.

Whether prior sales growth will be sustained at many airports when the final 2009 and 2010 figures come in seems doubtful. Yet, when the global economy and aviation sector recover (as they inevitably will), it is anticipated that strong terminal retail growth will resume.

The Rise of the Airport City

In addition to incorporating an expanding variety of shopping, leisure and business support venues into passenger terminals, airports are continuing to develop their public-access

property with hospitality, entertainment, and recreation clusters; office and retail complexes; conference and exhibition centers; and facilities for processing time-sensitive goods. The private sector has joined in, developing similar facilities just beyond the airport fence.

The largest concentration of hotel rooms on the U.S. West Coast surrounds Los Angeles International Airport. London Heathrow's new Sofitel hotel with direct access to Terminal 5 via covered walkway, measures up in design and guest amenities to any downtown London five-star facility. In addition to overnight transit passengers, it attracts wealthy international and extended-stay business travelers to its suites, which have rates as high as €3,000 per night. With 45 meeting rooms, a 180-seat theater, and a convention center accommodating 1,700 delegates, the airport hotel is the third biggest conference venue in the United Kingdom.

Major conference venues have sprouted up near other hub airports such as Atlanta, Chicago, Frankfurt, and Paris. For example, Airopolis, Roissy is a 130,000 m² business and conference development near Charles de Gaulle International Airport consisting of a convention center with 3,000 seats, three exhibition halls (45,000 m²), a 14,000 m² showroom, 21,000 m² of offices, and three 4-star hotels. The project with a budget of 300 million euros is targeted for completion in 2011.

Likewise, Dublin International has planned a 700,000 m² airport-linked commercial complex consisting of 500,000 m² of office space targeted to internationally-oriented businesses and 200,000 m² of hotel, convention, and retail facilities. An automated people mover will shuttle business people and other travelers from the airport city complex to international gates in six minutes.

Incheon International Airport is also developing large commercial tracts around its aeronautical core. Called AirCity, it currently consists of office buildings, hotels, a golf driving range and a water park, with a global medical center and Disney-scale theme park with casino hotels planned. Airport management is planning further development of offices, hotels, shopping and possibly convention facilities on a large tract near its passenger terminal. A maglev train system is in the works that will quickly connect the terminal and all AirCity commercial nodes.

Hong Kong International's SkyCity is being developed in a similar vein with office, retail, entertainment, hotel and exhibition complexes. SkyCity's first phase opened in late 2006 and contains SkyPlaza, a multipurpose commercial complex connected to the passenger terminal and the airport express train station. The lower floors of SkyPlaza provide a 300,000 sq. ft. retail center, including a 4D Extreme Screen theatre. Above this podium is Class-A office space with a total gross floor area of another 300,000 square feet.

SkyCity's first phase development also includes an air express train-connected 750,000 sq. ft. international exhibition center (Asia World Expo) with full-time trade rep offices, SkyPier (a China cross-boundary ferry terminal), a 650-room Marriott Hotel, and the SkyCity Nine Eagles (9-hole) golf course. The future phases will consist of a business park, hotels, and leisure and entertainment facilities to be developed in a pedestrian friendly manner replacing the current golf course.



SkyCity is the core of an evolving airport city adjacent to the main passenger terminal of Hong Kong International Airport. Shown is Phase I of the development which was completed in 2008 and includes over one million square feet of retail, offices and hotels, a 9-hole golf course, and a 70,000 square meter exhibition and trade center.

Airport City Locators

Airport Cities have evolved with different spatial forms predicated on available land and ground transportation infrastructure, yet virtually all emerged in response to four basic factors:

1. Airports need to create new non-aeronautical revenue sources, both to compete and to better serve their traditional aviation functions.
2. The commercial sector's pursuit of affordable, accessible land.
3. Increased passengers and cargo traffic generated by gateway airports.

4. Airports serving as a catalyst and magnet for landside business development.²

The most common airside and landside airport city commercial facilities include:

- Restaurants, catering and other food services, some locally-themed
- International brand and specialty retail shops
- Banks and currency exchanges
- Duty free shops
- Airline lounges
- Private meeting rooms with business support services
- Hotels and accommodation
- Office buildings
- Convention and exhibition centres
- Cultural and entertainment attractions including museums, art galleries, and cinemas

² LeTourneur, Christopher. "The Bricks and Mortar of Global Commerce." *Airport World*, Vol. 6, No. 6. December 2001-January 2002, Pp. 36-40. Kasarda, John D. "Logistics and the Rise of the Aerotropolis." *Real Estate Issues* 25, No. 4, Winter 2000, Pp. 43-48. Kasarda, John D. "Planning the Aerotropolis." *Airport World*, Vol. 5, No. 5, October-November 2000, Pp. 52-53. Kasarda, John D. "From Airport Cities to Aerotropolis." *Airport World*, Vol. 6, No. 4, August-September 2001, Pp. 42-45.

- Kiosks of all types
- Leisure and recreation venues including golf courses, race tracks, and gaming
- Personal and family services such as fitness facilities, spas, and child daycare for airport employees and passengers
- Medical and wellness facilities
- Wedding chapels
- Factory outlet stores oriented to both air travelers and locals
- Auction, exchange, and trade complexes
- Aviation-related industry such as aircraft maintenance, repair and overhaul
- Logistics and distribution, including perishables and cool-chain facilities, as well as value-adding logistics (labeling, testing, kitting, etc.)
- Free Trade Zones, special economic zones and bonded warehouses

Güller and Güller³ provide a useful framework for classifying aeronautical and non-aeronautical activities locating at and around airports. They distinguish three categories of activities based on the extent to which they are related to air traffic:

³ Güller, Mathis and Michael Güller. *From Airport to Airport City*. Airports Region Conference, Barcelona Spain, 2001.

- **Core aeronautical activities** are part of the technical operation of the airport, directly supporting the air traffic function.
- **Airport-related activities** have a direct relation to air-freight or air-passenger movements (e.g., logistics and distribution activities or terminal retail and hotels). Their competitiveness and/or business revenues are closely tied to the scale of air traffic.
- **Airport-oriented activities** choose the airport area because of the image of the airport and its typically excellent ground accessibility. The price of land and surface connectivity, rather than relation to air traffic, are the key factors in determining those activities locating in the airport area.

Along with air traffic patterns, surface connectivity, and land price, the nature of the local market (industrial structure and nearby resident population commercial demands) play a role in the type of airport-area development and activities taking place. So do airport boundaries. Those airports with limited developable land will see substantial airport-related and airport-oriented commercial development taking place “outside the fence” and therefore may not benefit directly from the real estate returns. They will, however, benefit from any additional passengers and cargo that such development generates.

The boundaries of numerous airports were established many decades ago, well before they assumed significant commercial and competitive development roles. Yet, just as urban development did not stop at the political boundaries of metropolitan area central cities, so airport-dependent development will not stop at the formal boundaries of airports. Outside the airport fence value-capture is therefore emerging as a key issue in airport city development.

Since airport areas are attracting businesses, workers, and residents at a heightened pace (e.g., research by the University of North Carolina's Kenan Institute has shown that employment growth near airports has been growing considerably faster than the metropolitan suburban area in which the airport is located), airport area commercial development reflects employee and resident needs in terms of incidental services. These include basic housing, recreation, food services, retail, health, child daycare, veterinary services, et cetera.

Often these needs are being provided in large mixed-use residential developments near the airport. Hence, many airport areas have also become metropolitan area population growth nodes.

Managing New Commercial Development

Consistent with their growing non-aeronautical roles and functions, airports are altering their operational units and management structure. Numerous airports (both public and private-sector operated) have established commercial and/or real estate divisions to develop their landside areas as well as foster development beyond airport boundaries. They include, among others, Aéroports de Paris (ADP), Dallas-Fort Worth International Airport (DFW), Frankfurt Airport [Fraport], Amsterdam Schiphol, Singapore Changi and Spain's Ferrovial Group which also owns UK airport operator, BAA. To briefly note a handful of management structures:

- ADP established a real estate division in 2003 to act as the developer, general contractor and construction project owner and manager of landside commercial properties at Paris Charles de Gaulle and Orly international airports.

- China Capital Airport Holdings, a state-owned enterprise that operates much like a private entity, is rapidly proceeding with its highly ambitious Beijing Capital Airport City. Working with partners such as Airport City Development Corporation, Ltd., (ACL) and municipalities such as Shunyi, it is developing shopping, entertainment, education, exhibition, sports and leisure, logistics, light manufacturing, finance, trade and housing at and around Beijing Capital International Airport. Its Airport City Logistics Park, being led by ACL, covers over 2.5 million square meters.
- DFW's management is aggressively expanding its commercial and real estate divisions to lease airport land to a wide variety of commercial tenants. It is also forming public-private partnerships to develop over 5,000 acres of property for office, hospitality, retail, entertainment, and wellness.
- Hong Kong International Airport has likewise established both commercial and real estate divisions to boost its terminal retail and develop its adjacent SkyCity commercial complex.
- Malaysia Airports Holdings Berhad is an entrepreneurial organization developing Kuala Lumpur International Airport's airport city, commercially anchored by its large Gateway Park that, in addition to retail and office development, includes motor sports, an automotive hypermarket and leisure venues drawing on the local as well as aviation-induced markets.

- Incheon International Airport Corporation (IIAC) is forming a variety of joint ventures with the private sector to develop its “AirCity” encompassing hotels, office buildings, logistics zones, shopping, entertainment, and tourism districts, as well as housing and services (e.g. medical) for airport city workers and residents.
- Dubai Aviation City Corporation (DACC) has been established to build and manage Dubai World Central, a US\$33 billion airport-centered set of cities under development 25 miles south of downtown Dubai. Cornerstoned by the new Al Maktoum International Airport, scheduled to open in mid-2010, DWC is planned to include logistics office towers, aviation-related industry, hotels, a megamall, golf course, and housing for 40,000 on-site workers. Slowed by Dubai’s real estate crises, DACC’s current focus is on developing its “Logistics City”.
- Amsterdam Schiphol, through its Schiphol Real Estate, which operates on the basis of private-sector principles, has been a key revenue generating arm of its airport operator, The Schiphol Group. Approximately 70 percent of the Schiphol Group’s profits come from aviation-linked commercial activities.
- The Airports Authority of India has turned to large private-sector conglomerates such as GMR and the GVK Group to lead consortia to operate and expand Delhi International Airport and Mumbai International Airport as well as construct and manage the New Hyderabad International Airport and The New Bangalore (Bengaluru) International Airport. Since shifting these airports into private-sector

leadership responsibility, both passenger-service quality and airport revenues have improved dramatically.

Further extending their corporate reach, some airports are even buying and/or operating other airports through special investment management divisions. ADPI (Paris), Incheon International Airport Corporation, Schiphol Real Estate, Malaysia Airports Holdings Berhad, Fraport, the Ferrovial Group (and its subsidiary BAA), Vancouver Airport Services (YVRAS), as well as Changi Airports International are among those pursuing cross-border airport ventures. Private-sector groups such as Macquarie Airports (now MAp) also own interests in and often manage multiple airports around the world that heavily rely on the airport city model.

These new operational structures and cross-border ventures offer testimony that airports are evolving from basic aeronautical infrastructures into multi-functional extended enterprises serving both aeronautical needs and profitable commercial development worldwide. To many not familiar with the new realities of airports, this enterprise model might appear to be a deviation from the norm, but it is fast becoming the 21st century way forward for large and mid-size airports.

The Airport City management model is thus quite distinct from the more traditional civil-engineering and aeronautical systems airport management model typically guided by government employees who run airports like public utilities using public-sector principles. The equally important commercial development role requires different strategies and operational skill sets driven by private-sector principles fusing innovative management, finance, and marketing with logistics and commercial real estate development.

In the Airport City model, airports must do business the way businesses do business. They must be far more nimble in their investment and operating decisions than is the case with most “public enterprises” which frequently need political approval for even relatively minor decisions.

The move to a corporate organizational form in airport city management promises to reduce the role of politics, lessen bureaucracy, and increase operational efficiency. Moreover, the corporate form of organization is much more in line with airport city objectives: earning a positive financial return with an obligation to maintain capital which is generally audited annually.

A major paradigm shift is also required in airport master planning. These plans must be at least as focused on commercial layout and efficiencies as on aeronautical layout and efficiencies. Ideally, the commercial components and aeronautical components would be synergized for optimal reinforcement. This is much more likely to occur when a larger holding company is responsible for both the aeronautical and independent, but related, airport city development.

In sum, airports from Amsterdam to Zurich and from Beijing to Seoul have embraced the Airport City management model to develop their terminals and landside areas as a pivotal means to financing airport operations while contributing to their profitability, cost-competitiveness in attracting airlines, and passenger satisfaction. Other international airports, not quite the scale of Amsterdam Schiphol or Seoul’s Incheon, have given commercial development a high priority (e.g., Abu Dhabi, Athens, Belo Horizonte (Brazil), Brisbane, Calgary, Dublin, Helsinki-Vantaa, Munich, Stockholm-Arlanda, Taiwan-Taoyuan, Vancouver, Vienna and Zurich). They all have

implemented the airport city concept in their business models, either explicitly or implicitly, and are incorporating a broadening range of traditionally urban economic functions to diversify their land-use and revenue streams. Such diversification is creating additional rewards for airport operators, their development partners, businesses, and the flying public.

The upshot is that airports are undergoing a significant transformation, taking on commercial functions previously reserved for private enterprise and spatial forms previously reserved for cities. Many larger airports also have the density of highway and rail connections that are usually associated with metropolitan downtowns. This is reinforcing their new roles as drivers of business location and urban development over an extended area.

The Emerging Aerotropolis

With the immediate airport area serving as a region-wide multimodal transportation and commercial nexus, strings and clusters of airport-oriented hotels, convention, trade and exhibition facilities, office parks, information and communications technology complexes, recreation and entertainment venues, time-sensitive goods handling and mixed-use residential/commercial developments are forming along airport corridors up to 30 kilometers outward. Because of excellent airport corridor accessibility, (highway as well as often rail) these strings and clusters of businesses efficiently serve local residents as well as air travelers.⁴

⁴ Schaafsma, Maurits, Joop Amkreutz, and Mathis Güller. *Airport and City*, Schiphol Real Estate, Amsterdam Schiphol Airport, 2009. Van Wijk, Michael. *Airports as Cityports in the City-region*, Netherlands Geographical Studies, 353; Utrecht, 2007.

Much airport area development is being undergirded by improving ground transportation. Highways have been widened and brought closer to the terminals. Trains have arrived in the form of metro, light rail, and suburban lines, including airport express rail service to city centers. Going further, airports in Amsterdam, Frankfurt, and Paris are directly connected to the European high speed rail networks, with platforms below air terminals. This improved regional and national surface connectivity not only reinforces development along airport corridors but also is spurring development in interstitial areas between access corridors.

Airport edge cities are evolving along these corridors and in their interstitial areas. Serving as models of planned postmodern urban mega-development, the largest of these airport edge cities have become globally significant destinations in their own right. For example, the city of Las Colinas (Texas) just east of DFW, is home to the global headquarters of four Fortune 500 companies (including ExxonMobil) and 2,000 other firms, as well as upscale residential, shopping, hotel, and recreational complexes.

Amsterdam Zuidas, located six minutes from Schiphol's terminal, houses the world headquarters of ABN Amro and ING banks, along with numerous European corporate headquarters. It has more than 150,000 square meters of Class A office, retail, and hospitality real estate. Nearly 9,000 multifamily residences are in the works.

New Songdo International Business District, located near Incheon International Airport, is being developed by New York City-based Gale International and South Korea's POSCO E&C as a 1,500-acre (600-ha), global business and trade center. The size of downtown Boston, this US\$35 billion mixed-use project, is currently the largest private sector development in the world. Much of this "Instant City" is already built with the final phase scheduled for completion in

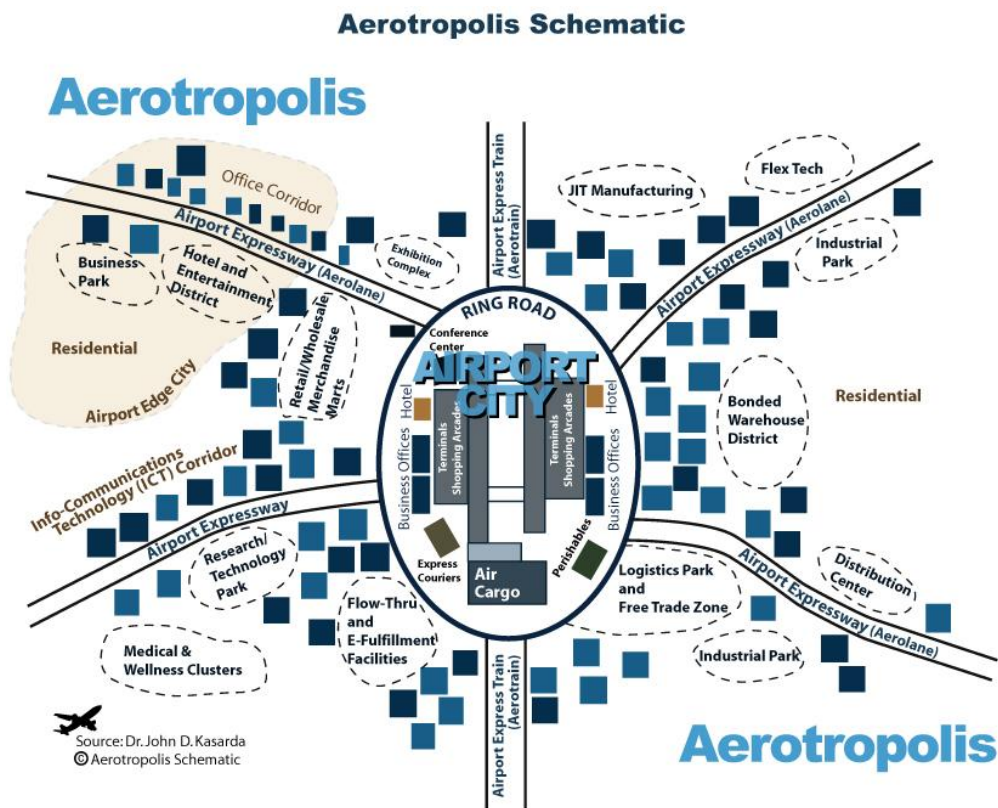
2015. Using New Songdo as a model of planned aviation-linked urban mega development, Gale International, in partnership with Cisco Systems, is considering similar scale airport edge cities in China, India, and Southeast Asia. These are being designed to be among the most electronically networked and environmentally sustainable cities in the world, in addition to their aviation connectivity.⁵

Airport edge cities, together with airport corridor and other airport-centric commercial and residential development are giving rise to a unique 21st Century urban form – the Aerotropolis. Analogous in shape to the traditional metropolis made up of a central city and rings of commuter-heavy suburbs, the aerotropolis form consists of an airport city and outlying corridors and clusters of aviation-oriented businesses and their associated mixed-use residential developments.

Reflecting the new economy’s demands for connectivity, speed, and agility, aerotropolis form follows function, with corridor and cluster development, wide lanes, and fast movement ideal. Airport expressway links (aerolanes), complemented by airport express trains (aerotrails), bring cars, taxis, buses, trucks, and rail together with air infrastructure at the multimodal commercial core—the airport city. Aviation-linked business clusters and residences radiate from the airport city, forming an extended airport-centric urban region, the Aerotropolis.

⁵ Lindsay, G. (2010). “Cisco’s Big Bet on New Sondo: Creating Cities From Scratch”. *Fast Company*, (142), 88-95.

A spatially compressed model of the Aerotropolis showing its current and likely future evolution is illustrated below. No Aerotropolis will look exactly like this but most will eventually take on similar features, led by newer “greenfield” airports less constrained by decades of prior surrounding development. The Aerotropolis is thus much more of a dynamic, forward-looking model than a static, cross-sectional model reflecting historic development to date.



Composite schematic of the Aerotropolis, an airport-integrated urban economic region anchored by a multimodal airport city core and nearby commercial development. Strands and clusters aviation-oriented businesses span up to 20 miles outward along airport expressway corridors (aerolanes) and airport-linked passenger rail lines (aerotrains).

This dynamism is well reflected around Hong Kong International Airport where its SkyCity is becoming the multimodal Central Business District of a far reaching Aerotropolis,

extending to Southern Coastal China. In addition to its highly-efficient Hong Kong Island and Kowloon expressway and air express train connection, SkyCity is being linked by the express train to its nearby Disney Theme Park that opened in 2006, about 10 minutes from the airport. The airport express train connects as well within 5 minutes to Tung Chung, a massive new town housing 45,000 airport workers and their families, complete with schools, churches, shopping and medical facilities.

SkyCity is also seamlessly connected through high-speed turbo jet ferries to the economically booming Pearl River Delta in southern coastal China. These high-speed ferries shuttle passengers, shoppers, workers, and tourists back and forth between SkyCity and key Delta locations in 30 to 45 minutes.

Such connectivity to the mainland exists for efficient movement of air cargo, as well. HKIA logistics ferries link the airport to the Delta's major manufacturing centers, shuttling parts and finished goods back and forth between the airport and the mainland.

Further integrating HKIA with both Hong Kong and the Delta will be a new expressway linking Hong Kong to Macau and Zhuhai on the mainland. This expressway scheduled for completion in 2016 will connect through the airport island (Lantau). It will not only enhance SkyCity's role as a destination for shoppers, tourists, traders and other business people from Hong Kong and Mainland China, but also solidify HKIA's role as the quadramodal (air, highway, rail, and waterborne) nexus of a highly expansive and growing Hong Kong Aerotropolis.

Aerotropolis Advantages

Driving the Aerotropolis are advantages they provide to business in the new speed-driven, globally networked economy. The Aerotropolis is proving to be a particularly attractive location for the business services sector drawing regional corporate headquarters, conference centers, trade representative offices, and information-intensive firms that require executives and professional staff to undertake frequent long-distance travel.

Business travelers benefit considerably from quick access to hub airports, which offer a greater choice of flights and destinations and flexibility in rescheduling; they also help travelers avoid the costs of overnight stays. Chicago's O'Hare Airport area has become the second-largest office market in the U.S. Midwest, while the Dulles region, centered around Washington, D.C.'s Dulles International Airport in the northern Virginia suburbs, contains more Class-A office space than does downtown Washington, D.C.

Firms specializing in information and communications technology and other high-tech industries consider air accessibility to be especially crucial. High-tech and other knowledge-based professionals travel by air much more frequently than do most other workers, giving rise to the term "nerd birds" in the United States for commercial aircraft connecting technology capitals such as Austin, Boston, Raleigh-Durham, and San Jose, California. Many high-tech firms are locating along major airport corridors, such as along the Washington, D.C.–Dulles Airport access corridor and Chicago O'Hare's I-94 corridor.



High-tech office buildings along Washington Dulles International Airport's connecting highway corridor in Fairfax County, Virginia form a key component of the Dulles Aerotropolis. The broader Dulles region has considerably more class A office space (93 million square feet) than downtown District of Columbia.

The Aerotropolis is proving equally advantageous to many goods processing sectors. Today's most competitive manufacturers use advanced information technology and high-speed transportation to provide fast and flexible responses to customers' unique needs. These firms build agile production systems that quickly connect them to their suppliers and customers around the globe, allowing them to source parts and ship assembled goods in a "time-definite" manner (on-time, just-in-time, every time).

A manufacturer's ability to meet customer demand also depends on the existence of a comprehensive ground-to-air shipping network of air cargo carriers, trucking companies, freight forwarders, and logistics providers. This network has been strengthened as demand for time-

sensitive manufacturing and distribution grows. Made possible primarily by proximity to an airport, a ground-to-air shipping network allows manufacturers to minimize their inventories, shorten production-cycle times, and quickly access novel inputs for customized products that create additional value.

The economic impact can be huge. Memphis International Airport (world headquarters of FedEx) has helped create over 160,000 jobs in its metropolitan area, more than 12,000 of whom work at the airport's FedEx facility each night. One in four jobs in the Memphis region is tied to the airport which had an annual economic impact of US\$29 billion in 2007. FedEx's growing European regional hub employing 2,500 at Charles de Gaulle is likewise beginning to have a major economic impact attracting a range of time-critical goods-handling businesses to the Roissy area.

Further fueling aerotropolis development, restaurants, superstores, factory outlets, and consumer services of all types likewise are locating along airport corridors to serve a dual customer base of air travelers and local residents. Athens International Airport, for instance, has a large IKEA and a Kotsovolos megastore, as well as a major factory outlet complex in an airport retail park located less than 3 kilometers from its main terminal. The vast majority of their shoppers are locals, who find the newly built expressway corridor to the Athens Airport a highly convenient connection to these large shopping facilities.



Athens Airport Retail Park hosts factory outlets and mega-stores.

Upscale retail is gravitating to airport areas, as well. Led by airport edge city Tysons Corner, the Dulles Airport region has the second largest concentration of retail in the United States, following New York City’s Manhattan Island. The Las Vegas Strip, basically a corridor extension of McCarran International Airport, generates as much revenue from shopping, hotel, and entertainment venues as it does from gambling.

As airport-integrated economic regions evolve, some are even developing their own place identities such as the “Amsterdam Airport Area,” or “Dulles.” The Aerotropolis as a preferred business location, commercial destination, and branded area is fast emerging.

Aerotropolis Planning Needs

Although much aerotropolis development to date has been spontaneous and haphazard — often spawning congestion and environmental problems — in the future it can be markedly improved through strategic infrastructure and urban planning.

- Dedicated airport expressway links (aerolanes) and airport express trains (aerotrans) should efficiently connect airports to major regional business and residential concentrations.
- Special truck-only lanes should be added to airport expressways, as should improved interchanges to reduce congestion.
- Time-cost accessibility between key nodes should be the primary aerotropolis planning metric rather than distance.
- Businesses should be steered to locate in proximity to the airport based on their frequency of use, further reducing traffic while improving time-cost access.
- Airport area goods-processing activities (manufacturing, warehousing, and trucking) should be spatially segregated from white-collar service facilities and airport passenger flows.

- Noise and emission-sensitive commercial and residential developments should be sited outside high-intensity flight paths.
- Cluster rather than strip development should be encouraged along airport transportation corridors with sufficient green space between clusters.
- Placemaking and wayfinding should be enhanced by thematic architectural features and iconic structures.
- Mixed-use residential/commercial communities housing airport area workers and frequent air travelers should be developed with easy commutes and designed to human scale providing local services and a sense of neighborhood.

In short, aerotropolis development and sustainable "smart growth" can and should go hand-in-hand. Many mixed-use residential clusters along airport corridors, for example, can be designed under "new urbanism" guidelines emphasizing internal walkability and community. Others, such as Amsterdam Zuidas or New Songdo International Business District, though of immense scale, can be designed for improved sustainability as well as economic efficiency, benefitting both place and region.

Information and communication technology should also be pivotal in future aerotropolis planning. Multi-media technologies should produce tastefully themed electronic public art along

airport transportation corridors that highlight the culture, history and economic assets of the region the airport serves.

Regional marketing through informative and aesthetically pleasing public art should likewise characterize the airport's terminals. Entrance and exit roads should be nicely landscaped with any dilapidated structures or unsightly areas along them shielded by vegetation or mural painted walls. By setting both the first and final impressions for many air travelers, the airport and its aerolanes represent a region's official welcome and send-off.

Global information and communications technology (ICT) networks will also help shape the aerotropolis. Advanced information processing technologies and multi-media telecommunications systems served by high-density fiber-optic rings and satellite uplinks and downlinks should be incorporated throughout the airport region, instantly connecting companies to their global suppliers, distributors, customers, branch offices, and partners.

Firms that require the fastest possible networking will thus have an additional reason to locate in the aerotropolis. This advanced ICT infrastructure is already appearing not only around major international airports like Incheon, Chicago O'Hare, Schiphol, and Washington-Dulles but also around US air express hubs such as Memphis (which serves global shipper FedEx) and Louisville (which serves United Parcel Service).

As multi-modal transportation and advanced communications infrastructure further develops at and around airports, the commercial real estate value of areas surrounding them will advance. A principal future determinant of aerotropolis land value, lease rates, and the type of

commercial use on a given property will be the time and cost of moving people and products to and from the airport and, via the airport, to distant markets.

The local time/cost proposition will be a function of the site's place along airport transportation corridors, and not necessarily of spatial distance. For example, a site 10 kilometres from the airport, but one stop on a high-speed rail line from the airport, will be worth more than a site 5 kilometers away with poor road and rail connections. To put it another way, the three A's – accessibility, accessibility, accessibility – will become the critical component of the three L's – location, location, location – in establishing aerotropolis real estate value.

Connectivity to markets will also influence aerotropolis land values. Market connectivity is measured by a combination of the number of distant markets served times the frequency of service to these markets, sometimes weighted by the size of the markets served or their hub status. Hence, an airport with five flights daily to a distant market will be better connected to that market than one offering two flights daily. Likewise, a flight to Atlanta or Chicago will generally yield greater market connectivity than one to Albuquerque or Cleveland.

Looking ahead, local and regional planning constraints will certainly exist, especially at and around older airports surrounded by many decades of prior development inconsistent with aerotropolis principles. It will take many decades of future planning and coordinated stakeholder efforts to adapt their surrounding land-uses to these principles. In such physically constrained cases, planning must be targeted and strategic as space becomes available with an eye towards the way a particular development will leverage and be leveraged by the airport and by greater region-wide development.

This will not occur under most current airport area planning approaches which tend to be politically localized, functionally fragmented, and often conflicted. A new approach is required bringing together airport planning, urban and regional planning, and business site planning in a synergistic manner so that future Aerotropolis development will be more economically efficient, aesthetically pleasing, and socially and environmentally sustainable. The real question is not whether Aerotropolises will evolve around major airports (they surely will). It's whether they will form and grow in an intelligent manner, minimizing problems and bringing about the greatest returns to the airport, its users, businesses, surrounding communities, and the larger region and nation it serves.