High-flying cities

Sky miles and other modern accommodations

BY CANDI S. CROSS

Topping $28,000 per night, the seven-star Burj Al Arab hotel symbolizes the wealth of United Arab Emirates, in part because of Dubai Logistics City.

Time travel is a centerpiece of countless science fiction tales, but in reality, airplanes do make it possible for humans to experience this bizarre phenomenon. Combine shopping for nanotech gadgets in Tokyo's Shinjuku district with a viewing of medieval paintings at the Getty Museum in Los Angeles. Is this itinerary too much for one day? Calculate a 17-hour time difference plus a 14-hour direct flight on an Airbus380 from Narita International Airport, and the passenger in question could end a calendar date in one place before beginning the very same date in another. Passing through the Los Angeles International Airport, this passenger would also contribute to the annual $90 billion that flows into the southern California economy, in part because of Asian travel.

If said traveler were to book the same flight in a year's time, there is no way to anticipate the difference in cost. Analysts concur that the ticket price may well decrease because of rapid evolutions in plane efficiency and airport expansion. Considering the number of airlines that will offer this route, flying from Tokyo to Los Angeles will amount to more frequent-flier award miles than anyone could have conceived just a few years ago.

Many variables are projected to enlist millions of additional passengers within the next decade, despite fees or phobias: gourmet food and drink selections, adjustable mood lighting and sound systems, built-in dehumidifiers, and better nonstop flights to dreamy destinations like Singapore and Dubai.

Expected to fly out of 70 airports worldwide by 2010, the Airbus A380 consumes 12 percent less fuel than current large aircraft.

Courtesy Civil Aviation Authority of Singapore

"Air travel will just keep growing barring any traumatic events," predicts Ashley West, Delta Air Lines' ergonomics manager. "More flight routes will open up. At Delta we are expanding to more international destinations, making the world more accessible to passengers. Security issues will settle down. The issues will still be there, but I think we will be able to accommodate people and change processes quicker than in the past."

Air transport is defining the future of cities, technology, trade, tourism, the environment, and the economy.

"We're increasingly becoming an air commerce-dependent world with an emphasis on great speed with large numbers in longer distances. This is all having local effects — as speed and connectivity become more important, whether it's a corporate headquarters or just-in-time manufacturing establishment or third-party logistics providers, it will be imperative to live closer to the airport," says John Kasarda, Ph.D., management professor and director of the Kenan Institute of Private Enterprise. Coined "father of the aerotropolis" by *Fast Company* magazine, Kasarda is largely responsible for a new trend in airport development worldwide: better, bigger, and even bigger.

An aerotropolis is said to be a city in which the layout, infrastructure, and economy are centered on a major airport. This special class of super-sized airports includes Bangkok's Suvarnabhumi, Beijing Capital Airport, Amsterdam Schiphol Airport, Munich Airport Center, and Dubai World Central. Most notably in the United States, Indianapolis Airport is currently building one of the most technologically and architecturally advanced terminals in the world, made up of 1.2 million feet of floor space.

"Having accessibility to locations around the country or around the world, businesses are more likely to locate near that airport. That's what then drives the development process and why areas near airports are growing bigger than other suburban areas of suburban rings around cities," Kasarda says. "Clusters of business parks, industrial parks, hotel and entertainment districts, and wholesale retail merchandise marts are included. Buyers and vendors may fly in, do the merchandise marts, and fly out. You have all these clusters forming as you go out of the arteries from the airport, which is developing as an urban core itself, not just a terminal. Hotels are becoming attached, exhibition centers, offices. For many airports, 50,000-plus people work there, which would qualify as a metropolitan section city if they were residents. But that's the core, that's the airport city, the non-aeronautical businesses that are there and the buildup of commercial facilities immediately adjacent to or on the airport property."

Dubai World Central airport sits at the crossroads of Africa, Asia, and Europe, allowing for direct flights to a wide variety of destinations.

DUBAI, A CLASS OF ITS OWN

Literally serving the world — at least its supply chain and commercial real estate interests, tourism, and global trade — Dubai World Central International Airport will support an annual cargo capacity of 12 million tons. This is more than three times that of Memphis, Tenn., today's largest cargo hub. Scheduled to function fully within the next year, the airport will also potentially handle 120 million passengers and all next-generation aircraft, including the Airbus A380. Four of the jumbo planes will be able to land simultaneously, 24 hours a day.

Not just an airport but the heart of Dubai Logistics City, an amazing package of sea, rail, air, and road connections for Africa, Asia, and Europe, Dubai World Central is too grandiose to spark competition, says Issa Baluch. Baluch is the author of the book *Transport Logistics* and president of Swift Freight International. "This area also includes a free zone and manufacturing center, and it is adjacent to one of the world's busiest seaports, Jebel Ali Port, making it a complete multimodal logistics platform," notes Baluch.

Offering weekly sailings to Dammam, Saudi Arabia and Bandar Abbas, Iran; regular road service to Kuwait and Bahrain; and weekly flights to Kigali, Rwanda and Lagos, Nigeria, Dubai Logistics City has become the home for companies rooted in every nationality, every industry. More than 125 of the world's major container shipping lines call at Dubai, according to Baluch.

Not all is business. A $28,000 suite at the seven-starred Burj Al Arab hotel is only minutes away from the airport. The World Travel and Tourism Council forecasts that visitors to United Arab Emirates will number 14 million by 2015.

Dubai has a sure partner to back up this explosion of goods and people: Emirates Airlines. Currently responsible for more than 50 percent of all flight movement through Dubai, the airline operates services to 85 cities in 57 countries. Nigel Page, senior vice president of commercial operations, describes a new nonstop route between New York and Dubai via Hamburg, Germany as a key part of the company's global expansion: "Our original two nonstop flights from JFK to Dubai were so successful it created a need for a third service."

Indicative of Emirates' award-winning service and ultra-modern fleet, this flight features access to more than 600 entertainment channels as well as complimentary gourmet dining and wine. Limousine service to dinner at the Ritz-Carlton in New York City and to the airport is also available through the airline, "no travel agent necessary."

Unparalleled properties

The name itself represents grandeur: Suvarnabhumi, Thailand's new airport, means "the golden land" and was named by King Bhumibol Adulyadej to adorn continental Indochina. Rooted first as Don Muang Bangkok International Airport, the overused hub reached its full capacity at over 37 million passengers per year. Even the runways became crowded, with planes occasionally clipping each other during takeoff. Suvarnabhumi Airport, which opened just months ago, is geared to support 100 million passengers per year.

Antonio Trani is an associate professor of civil and environmental engineering at Virginia Polytechnic Institute & State University who specializes in transportation engineering. Examining the logistics of "air-driven nations," Trani maintains that gargantuan expansions of airport properties in physical location, routes, labor force, communications, and complementary arteries (roadways and railways) such as what is happening in Bangkok is no longer unprecedented. This is because airports are very large, very complex parts of urbanization, globalization, and transport. But many variables will determine the actual success garnered from these staggering enlargements.

"We must try to understand how a new or expanded airport will impact a city, neighborhoods, other flying routes," says Trani. "We can run a fictitious airport somewhere in the world and make sure requirements are met. Many, many checks must be executed: visibility must be tested, weight control so to speak, simulation technology in every part of flying to optimize operations. The use of computers is integral to building the actual facility. In Tokyo and in Munich, the design of runways may have taken 25 years. Speed of getting logistics in place cannot be a factor because of increasing population, roadways, weather, and political climate. In Asia, demand for aircraft has grown considerably because of an increasing economy."

On the eastern side of Asia, another aerodrome grows — Beijing Capital Airport. Already a city of more than 14.5 million people, Beijing is set to host the 24th Olympiad in 2008. This will result in the construction of 300 residential and office buildings, an express railway that covers 27 kilometers in less than 10 minutes, and a new terminal with 120 departure gates. As the airport area commands the central gateway to China, it is expected to be a beacon of Chinese culture, economic growth, advanced aviation technology, and the most basic link between business and the general public — customer service.

While an expected, neutral ingredient in every business transaction and interaction, management teams at airports such as Beijing Capital Airport and Singapore Changi Airport premise costly training programs on service alone.

Shu Qin Kwan, corporate communications director of the Civil Aviation Authority of Singapore (CAAS) affirms: "CAAS strives to maintain high efficiency standards and invests in

Suvarnabhumi Airport near Bangkok offers more than 300 digital check-in kiosks.

Courtesy BangkokAirportOnline.com

customer service. We are also much focused on passengers and aim to give them a memorable Changi experience. CAAS has worked hand-in-hand with our airline partners, retail shops, and ground handling agents to make sure the best service is provided for passengers."

Seems like a common goal that many companies large and small profess to strive for. However, Singapore Changi Airport was voted 2006 Best Airport in the World by Skytrax because of an emphasis on customer relationships. And its connection to people does not come cheap. Featuring a business center with on-the-go translation and administrative services, fitness center and sauna, swimming pool, movie theater, unisex salons, picturesque meditative gardens, and shopping that practically pushes Rodeo Drive into second-class retail status, the airport scored high on Skytrax's survey of more than 7.2 million respondents.

Courtesy Civil Aviation Authority of Singapore

Singapore Changi Airport, voted World's Best Airport 2006 by Skytrax, features theme gardens of orchids, ferns, sunflowers, and cactus.

"To equip our officers with the necessary skills to carry out their duties efficiently, we have organized numerous well-received in-house programs," says Kwan. "Skills covered included negotiation, personal branding, supervisory leadership, and project management. Training was also extended externally, with officers taking the opportunity to attend both local and overseas technical, management and leadership programs."

Also grooming a relationship with partnering airlines, CAAS established the Air Hub Development Fund at $300 million for a three-year period that began in January 2006. The fund offers new incentives for airlines that grow their passenger traffic at Changi Airport and for charter flights between Singapore and unserved points, according to Kwan.

Gloria Bender, managing principal of transportation consulting firm TransSolutions, has evaluated expansion projects from concourses, control centers, and aircraft maintenance facilities in various airports. She notes that beyond in-flight gourmet meals, Nautilus pools, and cigar bars in this new class of airports, there's a straightforward view of aviation in terms of civic economics: "Everybody wants an airport because it is such an economic engine. Cargo movement is why the development of airports in China and certain parts of Russia is so important — it really has little to do with how nice the airport is."

As Bender points out, going somewhere still entails the basic steps. No matter how stunning the airport's architectural design, how well-dressed its concourses, or how upscale its amenities, the realities of air traffic congestion, rising fuel costs, security threats, checkpoint waits, and runway and plane capacities can't be ignored.

"The biggest challenge that our country faces in the coming decade is we have a shortage of airside capacity. We need to be investing in building some more runways. If you think about the summer of 2000 — and there have been so many events that have taken this memory away — the aviation in this country was approaching capacity," says Bender. "We were actually approaching limits. We had more planes flying than we could handle, and we had huge delays as a result. Of course, the recession that we started having and the terror attack in 2001 medicated that, but we are going back to that same problem. We are going to very quickly encounter problems with capacity on the airside; we need to come up with new ways to have our air space be more efficient."

Courtesy HOK

Slated for completion in 2008, the Midway Terminal of Indianapolis International Airport will cost an estimated $974 million.

Aeronautical realities

As air travel increases, the gap between land space and air space narrows. The environment encompasses both, and physical construction will either agree with nature or damage it. Two laws were established to ensure acceptable air quality and noise levels and minimize social consequences, according to the book *Planning and Design of Airports,* by Francis X. McKelvey and the late Robert Horonjeff. The Airport and Airway Improvement Act of 1982 and the Environmental Policy Act of 1969 enforce studies of the impact of the construction and operation of a new airport or expansion of an existing one. Concerns include air and water levels in communities, noise levels, ecological processes, and demographic development of the region. Twenty-five years ago at the writing of the Improvement Act, expansion details did not specify terminal sizes or roadway lengths.

A rendering of Indianapolis International Airport's Midway Terminal represents a design by HOK, one of the world's leading aviation architectural firms.

Courtesy HOK

"One of the main and unique challenges in managing construction sites in airport expansion projects is caused by the close proximity between construction activities and critical airport operations, which increases the level of hazards to both aviation safety and airport security," says Khaled El-Rayes, assistant professor of construction engineering and management at the University of Illinois at Urbana-Champaign.

Safety and security hazards include the risk of collisions between aircrafts and construction equipment and facilities; generating construction debris that can damage aircraft engines and landing gears; violating the allowable height constraints around runways and taxiways; placing heavy construction equipment in locations that can damage underground facilities; attracting hazardous wildlife to the construction site; and security breaches that may originate from the construction site.

"Maintaining airport security during construction operations is a critical task that needs to be carefully considered by airport operators and construction planners in order to control and prevent construction-related security breaches," says El-Rayes, who, with support by the National Science Foundation, is currently developing models to test the creation of security buffer zones between construction sites and secure airport areas.

Also to address contemporary challenges associated with the feat of building a 1.2 million-square-foot terminal, for instance, government agencies use different types of construction contracts and regulations that are designed to accomplish multiple objectives. According to El-Rayes, the aim of these regulations is to minimize service disruptions during construction, accelerate the rehabilitation of transportation systems, and maximize public safety and security since systems usually remain functional and open to the public during reconstruction.

Photo by Engelhardt/Sellin, courtesy Murphy/Jahn

Munich Airport Center employs state-of-the-art glass and steel construction, primarily for the roof, glass walls, and glass floors.

HOK, an architectural firm currently attached to expansions worldwide, tackles these challenges, along with further regulations unique to each country. They have facilitated airport construction in Boston, Sendai, Japan and Amsterdam, Netherlands, among other locations — all with an emphasis on sustainable design. In fact, HOK designed the Delta Air Lines Terminal A at Boston Logan International Airport, which became the first airport facility in the world to earn LEED (Leadership in Energy and Environmental Design) certification.

"An airport is supposed to be a civic symbol; it's supposed to represent the hopes and aspirations for a region or city," says Pat Askew, director of HOK's aviation practice. Part of a company responsible for more than $24 billion of airport construction in the past five years, Askew emphasizes that expensive, outrageously customized details pale in importance to safety and environmental sustainability. "It's a huge machine, a custom-built machine. The requirements for the design must change continually. Quality architecture does not depend on price as long as you have the basic amount of money to construct the facility, to heat it and cool it and light it and to accommodate the people that you need to accommodate. It's up to the talent of the designer, not only the architect but the interior specialist and structural engineer to get it right. If you build something that is not trying to be LEED-certified, then you are contributing in a negative way to the environment."

Energy consumption is a central tie to the environment also, as many tons of fuel are being burned above communities, causing harm even when it seems subtle. U.S. airlines alone consumed 19.3 billion gallons of jet fuel during a 12-month period that ended in August 2006, reported Airlines.org.

Systems engineers are critical to addressing pollution issues as a result of larger numbers in aircraft taking off in various geographical corners, Kasarda urges. Ten years ago, China harbored seven of the world's most polluted cities, according to the World Health Organization. Coupled with Asia's accelerated air travel, it remains to be seen if environmental hazards have improved or worsened. Trani suggests that multiple runways using formal technology and laser detection could prevent more environmental harm.

"Fuel is a big issue no matter where you are. It affects the airlines negatively all the way around. Anytime you have a 20 percent to 30 percent increase in price, such as in the last two years, there are going to be significant, long-lasting problems," says Trani. "The only way to respond to these changes is through technology.

You still have to fly the same routes, but in operations, aircraft could be changed in the long term, using more fuel-efficient engines in the future."

Super-sized solutions

Under fire for delayed production, the Airbus A380 is the largest passenger aircraft marketing production today and will play a part in environmental preservation. Weighing 1.5 million pounds, the jumbo plane burns 12 percent less fuel than current large aircraft. The A380's engine and 45- to 50-feet wingspan make it require less distance for takeoffs and landings. And designed to meet the most restrictive international and local noise and emissions requirements (such as in London's busy Heathrow Airport), the acoustic energy of the plane is 50 percent less that that of the B747-400. On the exterior, the A380 has the capability of two-deck boarding, which could reduce gate congestion despite the number of passengers each plane can accommodate (up to 800).


Photo by Christian Richters, courtesy HOK

Partially designed with cobalt blue tiling, the waveform arc of glass in Amsterdam Schiphol Airport's newest passenger terminal forms a gateway to the city's skyline.

In response to concerns about the plane's super size, Mary Anne Greczyn, manager of communications at Airbus North America, emphasizes that the A380 is the 21st-century solution to traffic growth: "Airbus is working with more than 60 airports worldwide to get them ready for the aircraft. The boarding/deplaning/turnaround time will be quite similar to a 747. The wing span accommodation and taxiway requirements are being dealt with, and many airports are already prepared."

Trani agrees that the Airbus A380 represents for the airlines a future investment and a flagship strategy. "This is a brand new classification. Next year, you will see more use of the 380. Some of the international hubs such as Chicago will be forced to use this aircraft," he says.

According to Erica Gingerich, who handles Airbus media relations, Munich Airport became Europe's first airport with official clearance for operations for the A380. "While Munich has been ready to greet the new superjumbo for over two years, many other European and American hub airports have been rushing to retrofit and upgrade infrastructure in order to eventually meet the exacting standards imposed by the International Civil Aviation Organization on so-called Category F airports," she says.

To be classified as a Category F airport, the facility must be equipped to handle aircraft with 65- to 80-meter wingspans and a 14- to 16-meter main landing gear wheelbase, which is the distance between the outer tires of the main landing gear. Strict qualifications in line with the most updated criteria include the length and width of runways, the airport's pavement loading limits, and the width and curve proportions to the taxiways.

In many ways, Munich proves to be the quintessential airport expansion — ripe for instant rates of return, considering that the launch of a new terminal doubled the airport's annual capacity from 25 million to 50 million passengers, and 31 percent of companies relocating to Munich cited the airport expansion as the primary factor in their location decision. Strictly from an economic perspective, cites Gingerich, the number of companies with offices at the airport increased from 471 to 531 in three years. "In statistical terms, that means that a new company settled at Munich Airport every 18 days. According to current forecasts, the airport could be providing employment for up to 38,000 people in 2015," she says.

Kasarda predicts that within that same year in the United States, there will be a billion people flying in leisure and business travel. "The airline industry is an uncertain and turbulent industry because it's hit by these shocks, not just 9/11, but SARS, terrorist threats in London, and wars. But, the fact of the matter is that all through these disruptions, cargo airlines and passenger airlines have also survived and have grown to higher levels," he says.

ON THE WEB

TIME FOR AIRBUS

Dream deferred? Slated to transport the world from sea to shining sea in droves, the Airbus A380 touts jumbo accommodations for up to 800 flight passengers. With all the production delays and executive resignations from the company in the past 20 months, however, will this plane stay parked at its castle in the sky? Read about the journey of the Airbus A380 in this fascinating timeline.
www.iienet.org/magazine/jan07/airbustime